

ANC

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

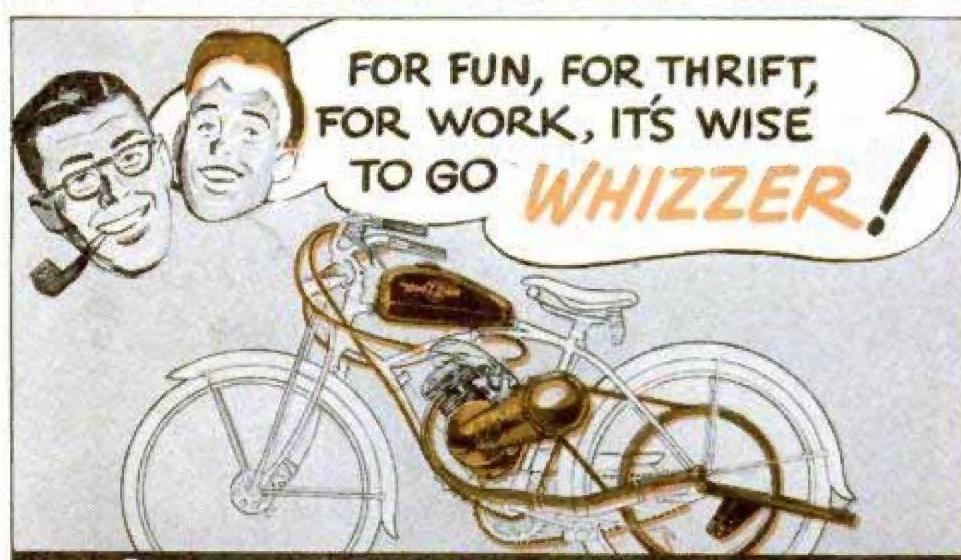
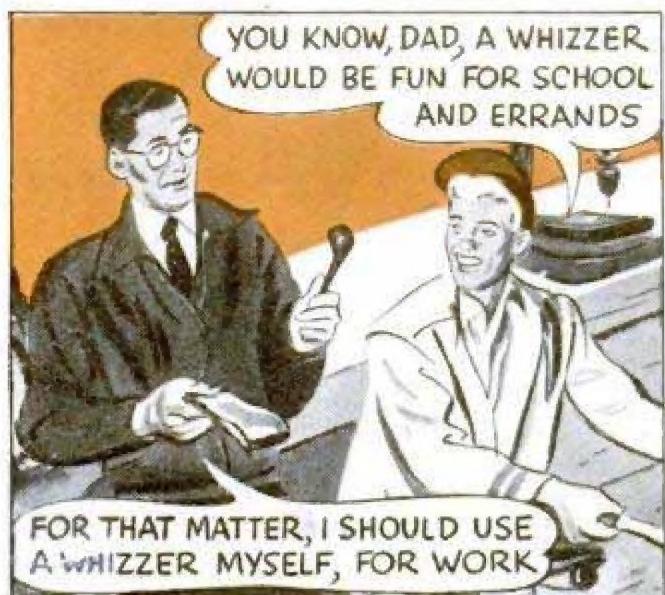
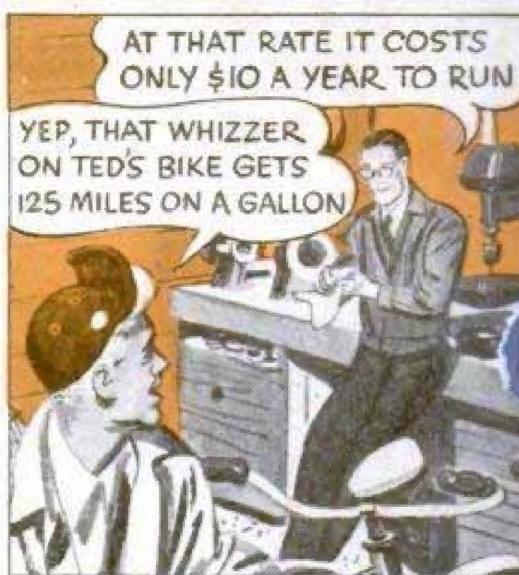
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BUILT THIS CABIN FOR \$300⁰⁰—Page 89

WHO EVER HEARD OF DRIVING 50 MILES FOR A DIME?

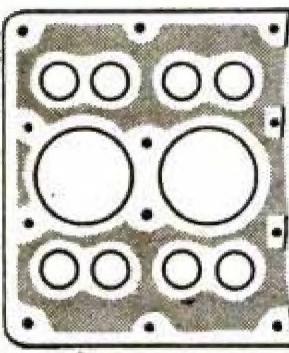


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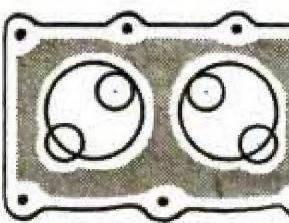
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VALVE-IN-BLOCK



DUAL-VALVE



VALVE-IN-HEAD

Among the most important automotive developments in years are advanced engines that are smaller in displacement yet develop more power than the engines they supplant. Significantly, their manufacturers changed from valve-in-block to valve-in-head design as one sure way of achieving increased efficiency—to give

Why a Valve in the Head Is Worth Two In the Block

Dual-valve engines, complicated and costly, develop more power than do single-valve engines of equal bore and stroke—because the greater area of *two* inlet and *two* exhaust valves per cylinder facilitates the flow of fuel mixture and exhaust gases . . . Chevrolet's valve-in-head design gains the same effect, simply and economically, with only *one* inlet and *one* exhaust valve per cylinder—because they open directly into the combustion chamber. That's why it can be said, "*A valve in the head is worth two in the block.*"

you *more miles per gallon of gasoline.*

Today, six makes of cars have valve-in-head engines, as against four in 1947 and three in 1941 . . . Today, clearly, the trend is to valve-in-head design . . . and today, Chevrolet alone, among cars in its price range, offers motorists the proved economy and efficiency of the valve-in-head engine.



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ARMY DAY-APRIL 6

Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

H. H. WINDSOR, JR., Editor and Publisher



this month's cover

NEAT AND TRIM as a clipper-ship's deck is the "Eastward Ho"—the seaside cabin shown on this month's cover. We couldn't believe it had been built for only \$300 until Norman E. Chaplin showed us the figures. He fashioned his cottage from stray materials that everyone else deemed useless, and offers the result as Exhibit A in his personal drive for homes for vets. He contends that any young man can build a year 'round home for a few hundred dollars if he has the grit to stay with the job. Apparently, it's not necessarily a youngster's project, as Chaplin is getting along towards 60. Mrs. Chaplin wields a deft trowel in laying up a neat brick wall. Daughter Rosemary dreamed up the cabin's name, which seems to fit the whaling-ship lore of the area. Turn to page 89 to read Chaplin's own story on how he cut a hundred corners to build his amazingly low-cost cabin on a Massachusetts shore.

Volume 91

APRIL 1949

Number 4

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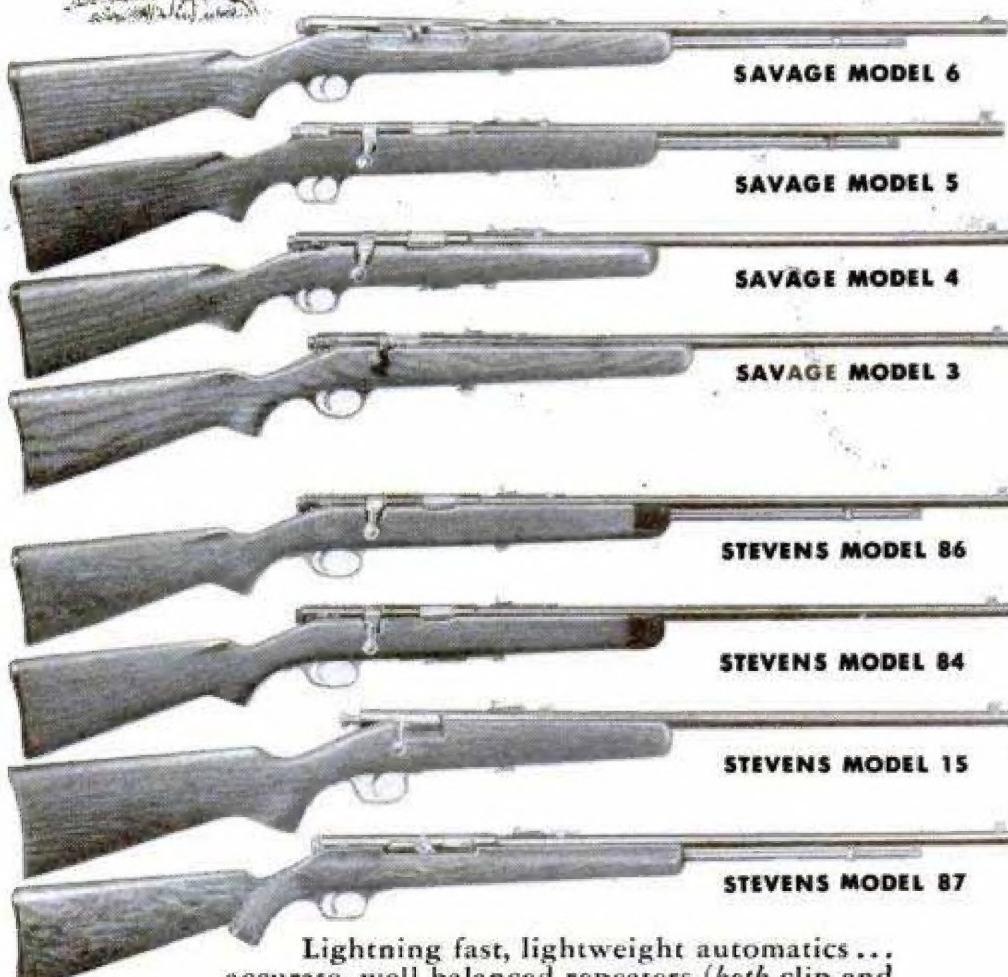
Other items, and manufacturers of available products described, are listed on pages 8, 10 and 12

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**THE
EDITORS**



THIS PICTURE means Stop! Look and Listen! to every reader. Not merely because it brings the exciting news that next month we present a new *Popular Mechanics* Build-It-Yourself House—but because there is nothing in the world that interests a reader more than his home.

Away back in 1933 we published plans for a \$700 home with four rooms and a lot of charm. Nobody knows how many thousands of these homes have been built by our readers, but today letters still come pretty regularly asking for the blueprints. We read with a nostalgic sigh the opening of that story in 1933: "Present low prices of materials make it possible for you to build this warm, livable four-room house for 700 dollars."

After the war we came to the aid of distressed home-hunters again, designing the now famous *Popular Mechanics* Build-It-Yourself House which a young veteran, under our guidance, built for himself. After this house appeared in April 1947, we followed with blueprints and a richly illustrated how-to-build-it book that has been read by over 50,000 home-hungry persons.

In this issue, the opening article shows a summer home built by a New Englander for \$300; it is full of money-saving ideas.

But look at what's coming! The new house which will make its debut in the May issue may well be the most sensational of our growing family of houses. The materials for this five-room home, complete with built-in kitchen cabinets, laundry and heating plant, cost less than \$3650! The exterior is of concrete blocks, stuccoed; the floor is concrete, with a vapor seal and insulation. Step-by-step drawings and photographs show its construction from vacant lot to lived-in home. It's attractive outside, spacious and homey within. Don't miss the new PM Build-It-Yourself Concrete-Block House in May.

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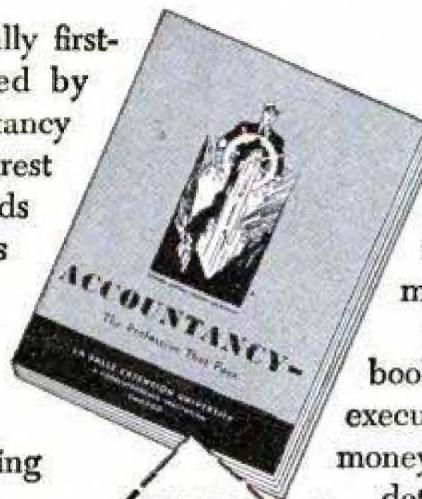


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Source of supply appears after items commercially available

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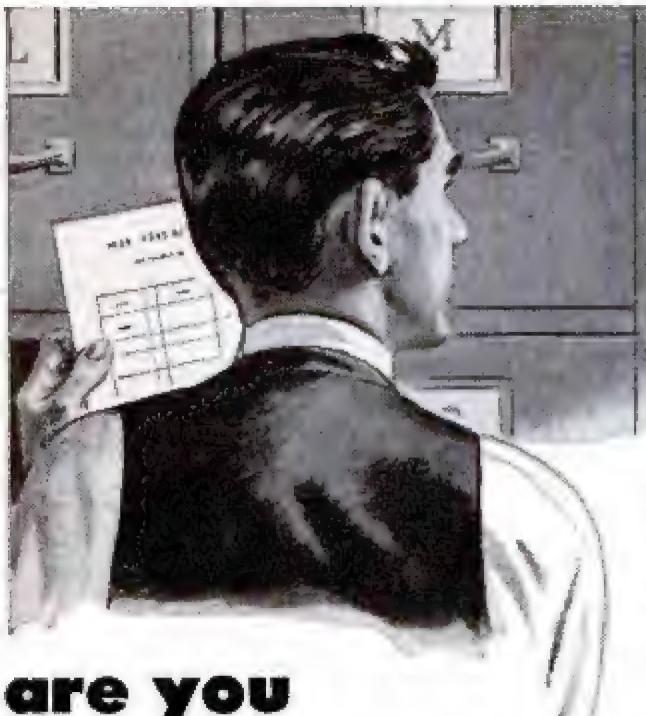
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- Highway Engineering
- Lumber Dealer
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- Radio General
- Radio Operating

Mold-Loft Work

- Patternmaking—Wood, Metal
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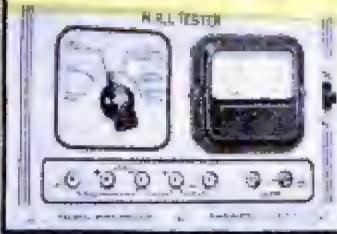
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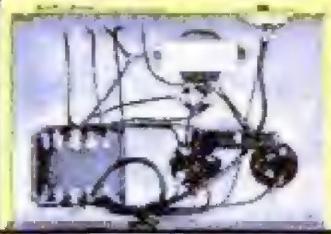
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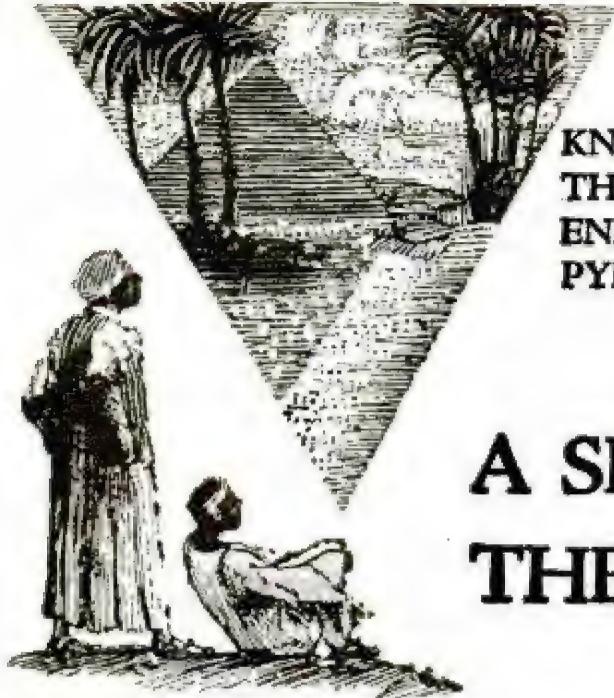
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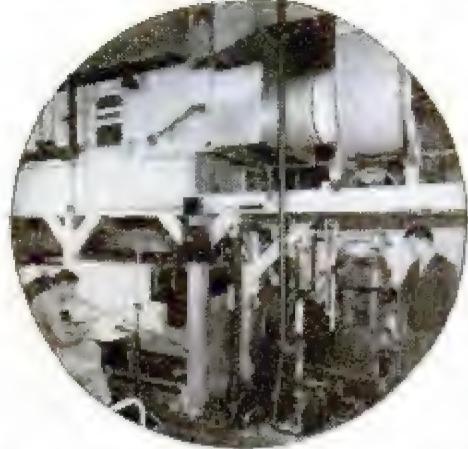
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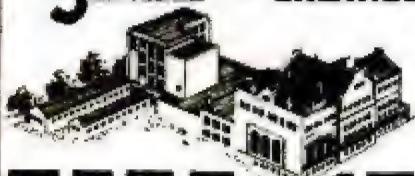
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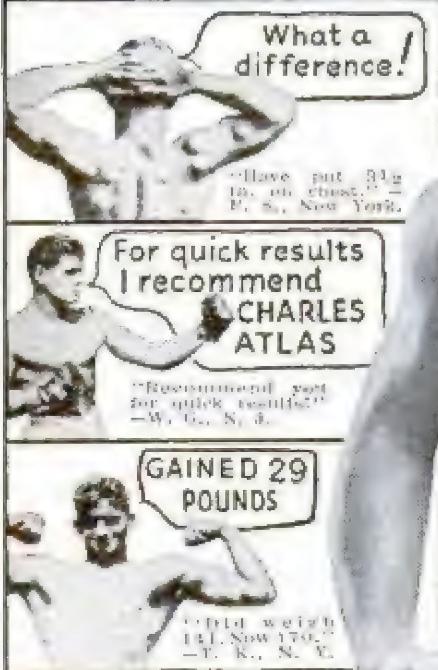
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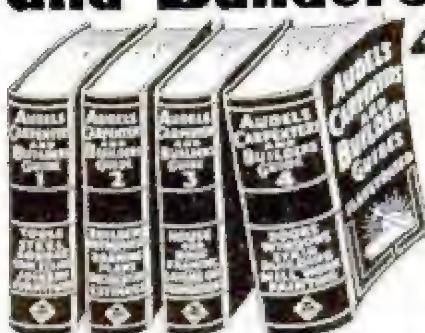
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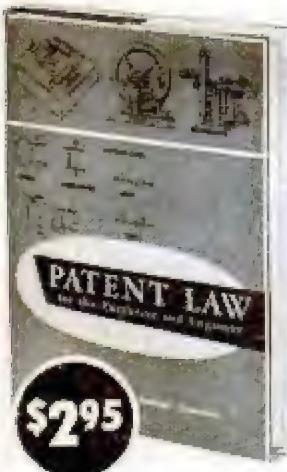
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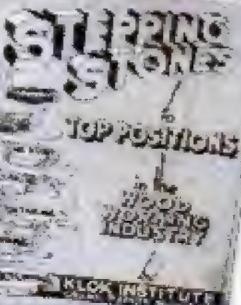
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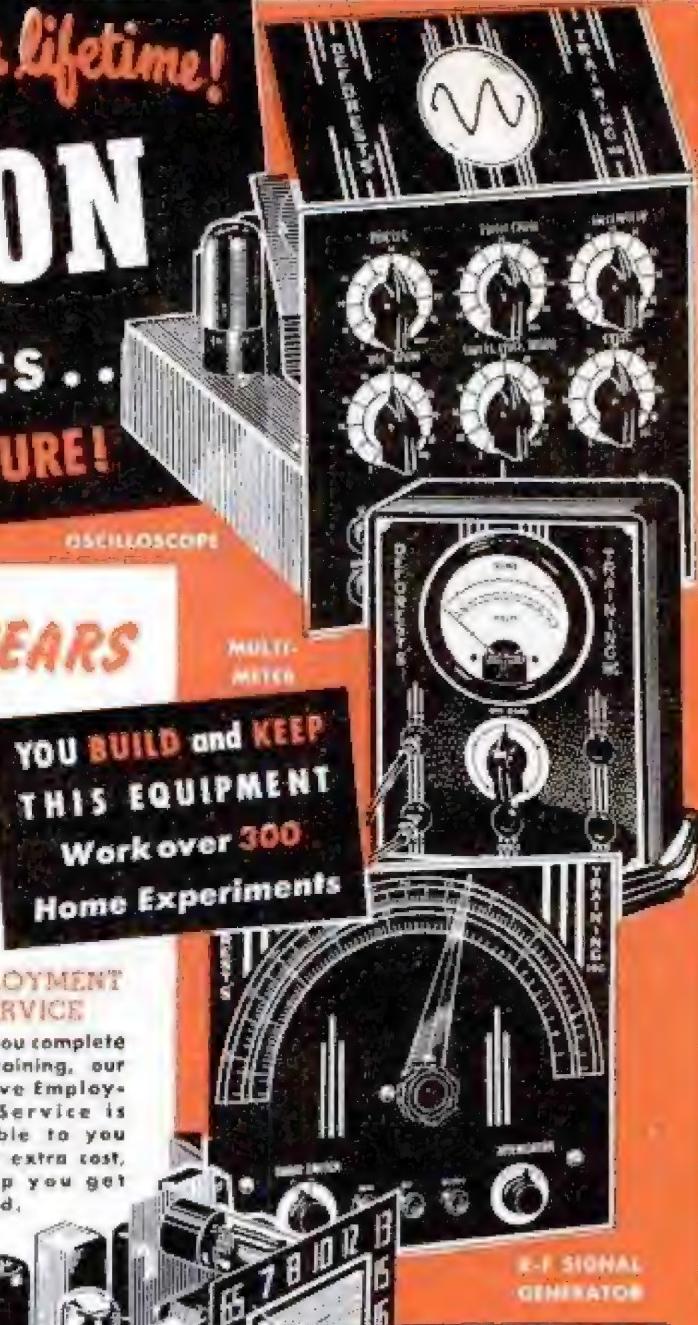
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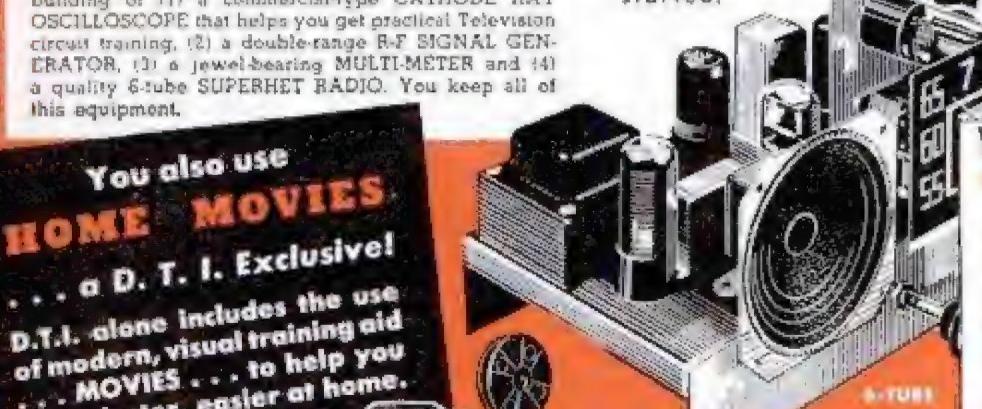
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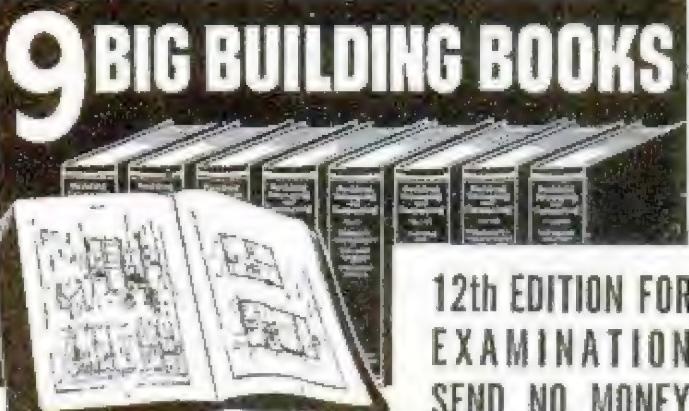
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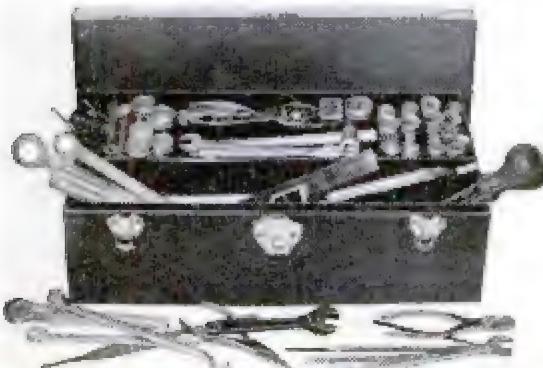
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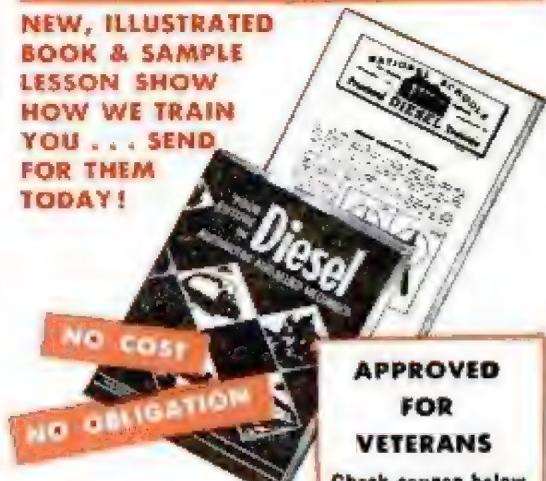
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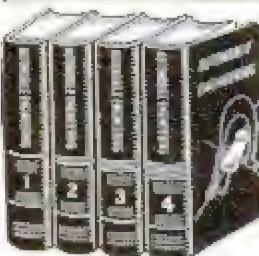
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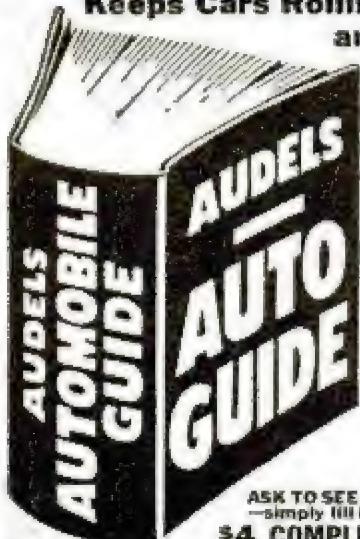
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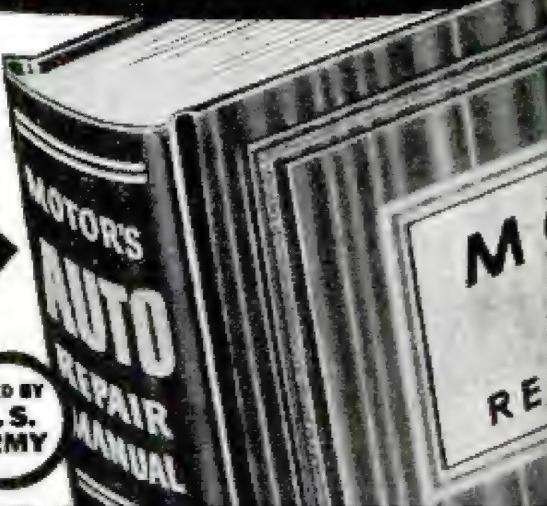
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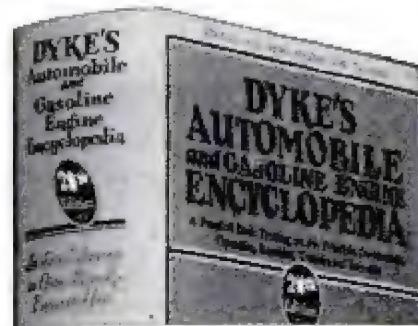
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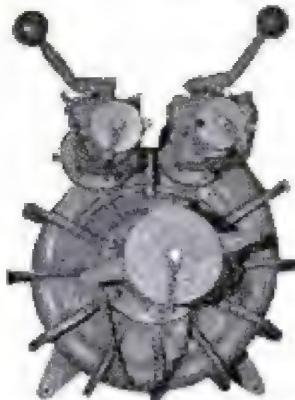
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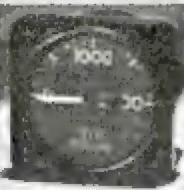
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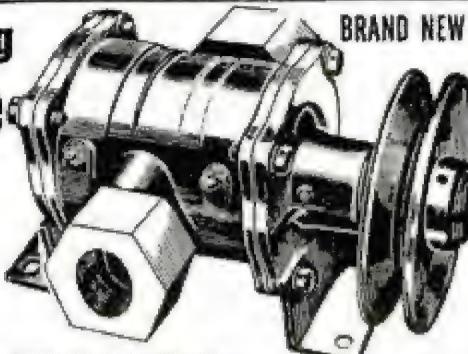
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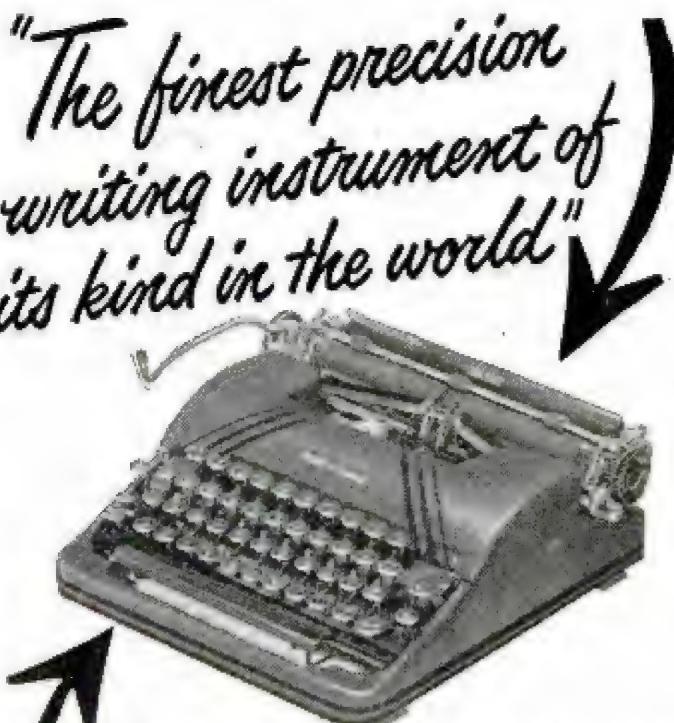
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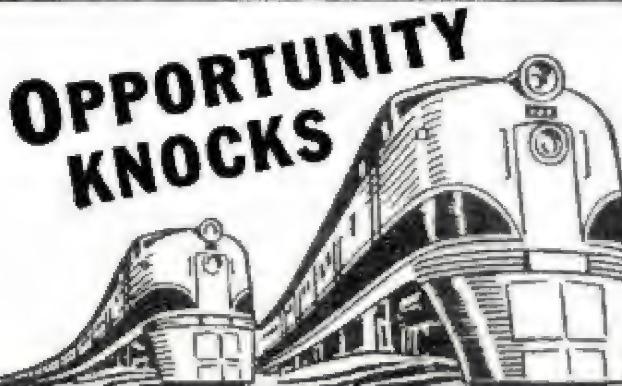
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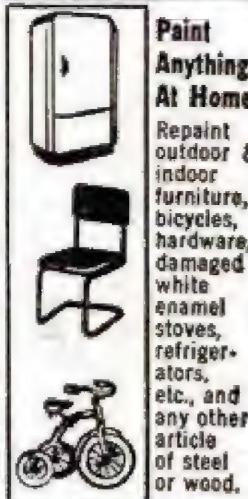


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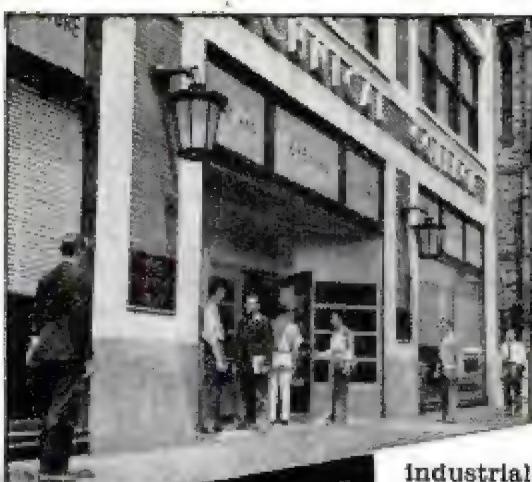
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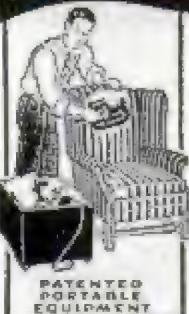
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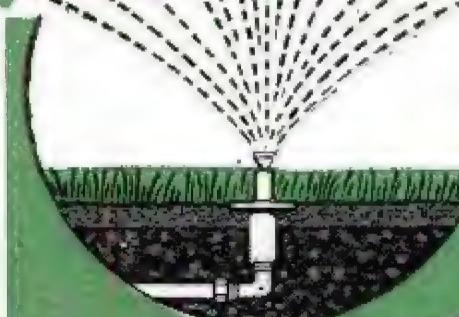
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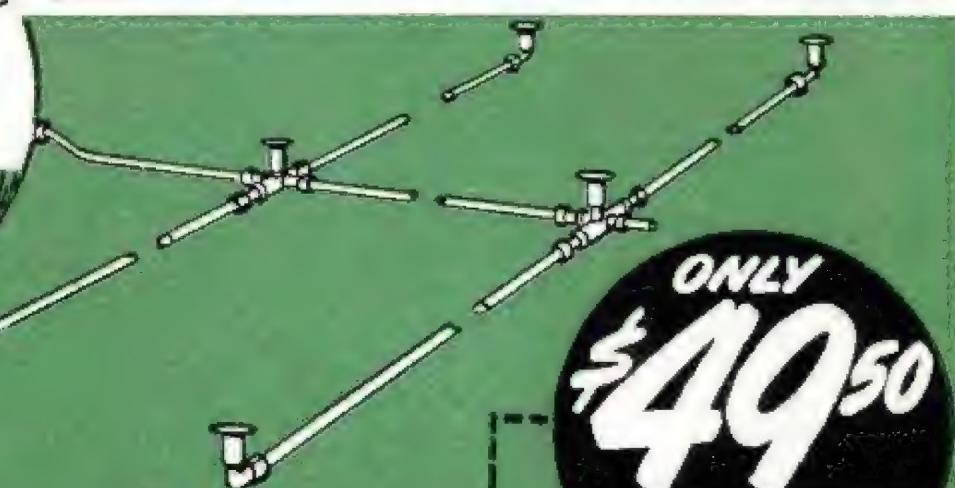
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INSTALL IT Yourself in One Evening

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Once your EVERSPRAY is in place, it's there forever. No upkeep. No repairs. No draining. No inspection. It's in for keeps—always ready to give you trouble-free service year after year after year. Yet a home "renter" can take it up—and with him, when

BE A
USER-AGENT
GET YOURS
FREE!

The very moment your EVERSPRAY is sprinkling, friends & neighbors will want to know where they can get one too! Just send us their orders on our User-Agent Plan and quickly get back in profits three to four times the cost of your own Everspray. Check coupon if you're interested in our Plan.

he moves. No wonder owners by the thousands are rushing to install EVERSPRAY. It means no more wet clothes or muddy feet, no more hours wasted in sprinkling—no more neglected, burned out grass for want of time—no more wet puddles or dry spots once this amazing EVERSPRAY is installed.

All Solid Brass and Copper Nothing to Rust, Rot, or Wear Out

Every inch of the tubing that goes into an EVERSPRAY Underground Sprinkler System is made of solid copper! Every single fitting and connection is made of solid brass! The fittings are machined to assure perfect fit and prevent leakage. No part can rust! There are no rubber gaskets to rot or disintegrate.

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Salemen, Distributors and Crew Managers wanted to call on home owners, hardware stores, department stores, and other retail outlets. Biggest summer seller ever invented. Make tremendous profits between now and July. Rush name air mail or telegraph for complete facts, discounts, commissions, demonstrator offer, and details of spectacular, sure-fire "JACK POT" Pyramid selling plan.

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We unconditionally guarantee the Everspray Underground Sprinkler System. This guarantee is made by one of the largest fabricators of copper and brass products in the world. If Everspray is not exactly as described in this advertisement or in our printed literature, the entire system may be returned to us within 10 days after purchase and the purchase price will be refunded promptly and in full. You may buy direct from this advertisement with perfect confidence. • If you don't order now, at least get all the facts. Send name on coupon for a beautiful folder containing pictures and descriptions of Everspray. It is FREE—no charge at any time. Send name today and be first in the neighborhood to enjoy Everspray.

Everspray Products Co., Dept. 24

*A Division of Everhot Products Co.
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Only EVERSPRAY gives you all

of these exclusive features

**QUICK!
EASY!**

After you install your new EVERSPRAY, fold down the sod that was folded back, and the keenest eye can't see where you made the narrow, shallow trench that holds your "million-dollar estate" Sprinkler System.

**A M A Z I N G
"POP-UP" HEAD**

Nothing else like it. Out of sight at sod level when not in use. Run lawn mower or roller right over them. Rake can't break or damage them. Children can not temper with recessed spray heads. Feet can't trip over them. Yet they pop up above grass level when water is turned on—and drop back when water pressure stops.

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\$5.00 AN HOUR

Yes, it's possible for one man to turn out enough work to make \$5.00 an hour for his time. Think of how that pyramids when a partner or the whole family works.

Old Established Firm Backs You Up

The Warner Electric Company just celebrated its 26th year of success. You get a *Real Start* when you "join up with Warner"—you get real *Guidance to Success*.

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RED Hot home mail manufacturing business opportunity. Everything furnished! 300% profit! Facts free. Bridges, 286-A Third Avenue, New York 10, N. Y.

MAIL Business opportunities—New plans; Proven propositions, "What to sell" services. Different! Profitable! Write: Smith, Box 2592-J, Hines, Illinois.

CALIFORNIA Almanac and state fact book, 568 pages profitable information, facts, figures, data, 42 maps, 36 charts, 390 tables, 93 special articles. \$1.50 postpaid, free circular. Sunland Stationers, Box 218, Sunland, Calif.

OPERATE Your own photographic business. Sales terrific! Cameras, projectors, enlargers, darkroom equipment, accessories, etc. Free details. Peace Products Co., Dept. 701, 152 West 42nd St., New York City.

FIRST Steps in Mail Order tells how to start a mail order business the right way. Will save you hundreds of dollars in costly mistakes. Send 25c for this 35-page book now. Ralph A. Long, 208 West Broad St., Tamaqua 2, Penna.

LEARN The three keys to success. (1) Choosing the right products. (2) Sources of supplies. (3) How, where and when to advertise. Free particulars. Business Plans Foundation, Box 56, Madison Square Sta., New York 10.

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NATURAL Molding Latex. Extra thick. Free sample. W. Wooley, 115-A Donald, Peoria, Ill.

MAKE Hollywood style marble-glazed cement pottery, birdbaths. Home-shop. Benches, fountains, stucco-rock walls, garden ornaments; chemically colored. Dime brings sample, amazing pictures. Hollywood Cementcraft, 8527-R Wonderland, Hollywood 46, California.

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MECHANICALLY Inclined? Resurface butcher blocks. Lifetime business. Roy Crawford, Keyport, New Jersey.

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PLASTERCRAFT Supplies. Rubber molds, natural liquid rubber, rayon and cellophane flock finishes, etc. Illustrated catalog and "Plastercraft" course free on request. Blue Rapids Supply, Blue Rapids, Kansas.

LEARN Piano tuning at home in thirty days. Unlimited income. Sound recordings, electric record player, tools and instructions furnished. Write Capitol City Tuning School, Department PM, 211 East Michigan, Lansing, Michigan.

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MEN And women to sell house to house famous Nu-Plak Products, wall plaque sets and bronzed baby shoes. Good deal. Send for box assorted samples, \$4.00. Write Marlins, Inc., 4630 Broadway, Chicago 40, Illinois.

BIGGER Income for you! Sell popular priced quality shirts direct. Big advance commissions. Bonus. Steady repeats. Permanent, profitable business opportunity. Also profit-making companion line. Write today. Free outfit. Bostonian Mfg. Co., Dept. 13, Boston, Mass.

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LOOK Here! Wanted—Men and women to start in business on credit. Sell some 200 farm-home products. Thousands of dealers now make quick sales, big profits. For particulars write Rawleigh's, Dept. D-182-PPM, Freeport, Ill.

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SUDSY Auto wash sells to service stations, auto dealers, fleet truck operators, etc. Quick selling highly profitable line. Several exclusive territories open. Six envelopes, each enough for one car wash and details for 9¢ in stamps. C. H. Berry Mfg. Co., 2509 So. 3rd St., St. Louis 4, Mo.

AMAZING New car wax gives sparkling showroom finish in minutes, 350% profit for producers who introduce this lightning seller. Rush name for free sample. Herkiss, 1451-P North Cicero, Chicago 51, Ill.

FREE Nylons given if Kendex hosiery runs or snags! World's only women's hosiery sold with written guarantee amazing everybody. Mere words could not express unbelievable money-making opportunity. Fantastic earnings become reality. Armstrong earned \$202 in 9 days. Watkins sent 92 orders in one day. Imagine replacing hosiery free regardless of cause—whether use or abuse! Truly sales dynamite for terrific profits. Even if you never sold before, three magic words: "Guaranteed Against Everything" will open doors for you—make women listen and pour money in your pocket. Complete line from sheerest to service (15-20-30-40-60 denier) all lengths 28 to 35 inches—latest colors—seamed full fashioned and seamless. No competition because Kendex guaranteed nylons not sold in stores. Also complete line men's hosiery actually guaranteed for one full year! Nothing like this anywhere. Includes rayon, nylon, lisle, wool, cotton, mixtures, etc. All styles, patterns, colors, prices to please everybody. Thousands shipped daily. 100,000 pairs constantly in stock for fast delivery. Over 30 years in business. You need no money or experience. Nothing to pay now or later. Show free outfits. Write orders. We deliver and collect. Big advance cash plus huge bonus. Earn money spare or full time—exclusively or side line. No restrictions. Become manager—appoint others to sell for you—earn steady income on their sales. Complete money-making outfit including salesbooks in color, samples of hosiery materials, etc. furnished free and prepaid. Simply mail name and address to: Kendex Company, Babylon 43, N. Y.

MAKE More money selling personal initialized individualized belts, buckles, cap badges, western buckles, tie holders, name plates. 2000 emblems to choose. Big profits, whole or part time. Write today special outfit offer. Hook-Fast Specialties, Box 1425, Dept. 6, Providence, R. I.

NEW Products needed everywhere. Precision build Addomatic adding machine \$21.75. Jewelry crafted stainless steel tabware \$8.95. Unusual quality, big profits. Repeats. Artcraft Specialty, Westmont, Illinois.

ELIMINATES Muggs. Window Wizard mechanically cleans glass surfaces in seconds. Quick profits. Sample \$1.00. Wizard Mfg. Co., 6529 E. Boyne St., Downey, Calif.

SANITARY Automatic toothpick dispenser for homes, restaurants, etc. Agents big commission. Write Sanipik Distributors, 601 So. Vermont, Los Angeles 5, Calif.

POCKET Plastic calendar cards and novelties. Write for particulars and samples. Webber Co., 2248 Belmont, Chicago, Ill.

SKYROCKET Your profits! Now! Just released! Modern Wonder Book of Knowledge. 52 books in one giant volume. Lavishly illustrated. Everybody prospect. Cash daily. Early birds' harvest. Hurry for details! Universal House, 1020-F Arch, Philadelphia, Penna.

SEWING Machine electrification kit. Nationally advertised. Has Good Housekeeping Guaranty Seal. Can be demonstrated and sold in 5 minutes. Make at least \$5 per sale. For complete details write today to Brownell Distributors, Inc., Dept. PM, 308 Canal St., New York 13, N. Y.

AGENTS Make big money selling "Ear-Buds," the perfume earring sensation. New designs, particulars free. Minot, Inc., Box 71, Dorchester 22, Massachusetts.

AGENTS—Unbelievable, until you have tried this self selling foot bath powder. 98% people need it. 50% profits. Excellent repeater Rush name for free sample. Saari, 1916 Sheffield, Chicago 14.

GUARANTEED Swiss watches, jewelry, \$2.95-\$20.00; collect advance commission; balance c.o.d. Brookline, B-1975AD. Little Rock, Ark.

\$4.00 AN Hour selling KF (air flow) carburetor valves. Saves gas; improves performance. All motorists prospects. Guaranteed sample \$1.00. Details 1st class for stamp. Box 94, Englewood, Colorado.

MUSIC Greeting cards. All occasions. Dorby Music Cards, P.O. Box 738, Morris-ton, New Jersey.

CONVINCE Yourselves how profitable it is selling revolutionary window advertising units to storekeepers. Send \$2.50 p.p. for trial kit and instructions, or c.o.d. plus charges. Duxton Co., 55 E. Washington, Chicago, Ill.

PAST Profits selling In-Door Swings, \$2.95. Mothers love it. Turns doorway into indoor playground. No bolts, screws, nails. Write for information. Doorway Swings, 319 N. Robinson, Oklahoma City, Okla.

I'LL Put a "shoe store business" in your pocket! Nation's leader trains you to make big money! Fit men, women. Free sample outfit—Write today! Consolidated Shoe System, Dept. S-315, Chippewa Falls, Wis.

CLEAN-O-WAX—Sell the new product of our time. Cleans, polishes, waxes, one operation. Saves 50% labor. Retail \$1.00 will send two full size cans for \$1.00 with sales proposition. Charter Oak Company, 251 Cedar Blvd., Pittsburgh 16, Penna.

EXCELLENT Sideline, good profits with new, guaranteed product, tested by U.S. government. Absolute necessity for bakers, restaurants, hotels, homes, farmers. Beats competition, steady repeater. Cart, 6118-P Laurel Hill, Woodside, N. Y.

EARN Big money year 'round. Be a one-person-department-store. Take orders for shirts, ties, hosiery, lingerie, household linens, etc. For information. Corporative Merchandisers, Dept. PM-13, 547 Broadway, New York City 12.

NEW! Sell internally carved costume jewelry. Dept. D-35, Astoria Products, 631 3rd Ave., New York City.

UP To \$30.00 a day as sideline! Sensational new proposition for homes and businesses. Limited exclusive territories still available. Send 3c stamp to National Key Insurance Co., Room 900-14, 30 West Washington, Chicago, Ill.

\$6.00 HOURLY Showing Firestone Velen handbag—opens into large shopping bag. Fastest seller in America. Women buy several for gifts. Commissions advanced daily. Sample furnished. LeNard, 179-C, West Washington, Chicago 2.

HOTTEST 30c item on the market. Write National Sale & Service, Greenville, Penna.

BE Renewal headquarters for all magazines. Handle everything at home. Big profits. No experience. No capital needed. Free catalog tells how. Write McGregor Magazine Agency, Dept. 129, Mount Morris, Ill.

AMAZING New non-electrical burglar alarm for windows, or doors of homes, stores, offices, etc. Millions of prospects. Sets on sight. 100% profit. Easy sales. Tremendous opportunity. Retails at \$2.25. Write immediately. Robertson Company, 228 N. LaSalle, Chicago 1, Ill.

FREE Water and our concentrates, make flavors, lotions, shampoos, 125 products, labels, bottles supplied. Qualeco, F20030 Russell, Detroit.

BIG Money—Fast! Sell quality plastic tablecloths (from \$4.00 dozen), curtains, aprons, etc. Factory prices. Free samples! Durever, 282-C Albany Ave., Brooklyn 13, N. Y.

MEXICAN Feather pictures. Unusual novelty. \$1.00 (stamps) brings \$2.00 worth samples, details. Refunded if unsatisfied. Aztec Art-P, Apartado 763, Mexico City.

BOYS! Earn big money and bonuses easy selling brass name plates for neighbor's doors. Write HubStamp, 357-A Congress, Boston, Mass.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address. 25c. Stamping outfit, emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

PHOTO-Salesmen-agents. Sell beautiful hand-colored plastic enlargements. Collect deposit, we deliver. Profitable sideline. Send card for free sample kit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.

INFORMATION — Wholesale supply sources. Moneymaking plans. Increase your income! Write Reynard Service, Smithfield 3, Ohio.

SELL By mail books, novelties, bargains! Ready made circular service! Large profits! Catalog free! Elfco, 432 North Wells, Chicago 10.

SCHOOL Seniors—Earn 40% commission selling classmates America's most beautiful graduation name cards. Largest selection. Out-sells all others. Free sample kit. Printeraft, Dept. M, 1425 E. Elm St., Scranton 5, Penna.

BIG Money selling cast iron and aluminum cooking utensils direct to consumer, exclusive designs. Free illustrations. Jones Machine & Foundry Co., Chattanooga 2, Tenn.

MAGIC Cleaner—Laundry soap deal. Hotter than a firecracker. Big profits. Sample free. Bestco, 4642 No. Central, Chicago.

GOLD Lacquered window sign letters. Large sizes penny each. New foils. Absolutely beautiful. Free samples. Atlas, 544 W. 79th, Chicago 20.

EXCELLENT Sideline for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also, make money with our line of automobile initials and sign letters. Free samples. "Ralco" XL-Roxbury, Boston 19, Mass.

AGENTS—300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Letter Co., 438-B North Clark, Chicago.

HIGH-GRADE SALESMEN

SELL Ultra-blue stock signs to stores. 1000 slogans, comedy, general, religious, "7x11" cost 6c, sets 35c. Make money. 15 samples ultra-blue signs "7x11" \$1.00 postpaid. Lowy, 8 West Broadway, Dept. 458, New York City 70.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. M-39, 7530 Greenwood, Chicago.

SALESMEN, 100% Profits selling fine aged imported briar pipes. Free details. Union Distributing Company, 210 5th Ave., Suite 1102, New York City 10.

SALESMEN, Earn \$100 weekly, selling only six pair shoes daily. Commission and bonus. Wide variety for men, women, children. No investment. Experience unnecessary. Tanners Shoes, 410, Boston, Mass.

BIG Money selling fluorescent lighting fixtures for manufacturer in your territory. Complete line. Latest designs. Low prices. Free outfit. National Lighting, PM, 4221 Harrison, Chicago.

SALESMEN Earn \$100 per week up calling on stores and individuals. Selling ventilating equipment. Everyone a prospect. Write for free 30 page catalog and plans. No investment required. Appliance Distributing Company, 163 Walton St., Atlanta, Ga. Dept. MB.

FANS, Fans—Salesmen making \$50 to \$100 per day selling our electric fans, sump pumps and printed self sticking advertising tape. Write to Universal Fan Co., Inc., Peru, Indiana.

SALESMEN—Put yourself in line for big money, real future. Keep stores supplied with 5c-10c to \$1 counter goods. Nationally advertised merchandise. Top profits for you, merchants. Liberal deals boost sales. Sideline or full time. World's Products, Dept. 10-R, Spencerville, Ind.

TREMENDOUS Earnings showing revolutionary new business need. Business and professional men buy on sight. Free facts. Slocumb's Service, 215 Cisby Place, Macon 3, Georgia.

SENSATIONAL Commissions selling 15 color sport shirts, pajamas, nylon lingerie. Free portfolio. Jared Manufacturing Corporation, Rockville Centre 1, New York.

EARN Big money fast! Sell finest-quality advertising work uniforms to garages, factories, filling stations, etc. Free selling kit. Tops, Dept. PM-449, Rochester, Ind.

MAKE \$200 Weekly and over taking orders outstanding quality metallized baby shoes. Free starting outfit. Marson's Bronze Art, 1059 Lewis, Long Beach 13, Calif.

STOP! Want to make money all year round selling a complete line, uniform trousers, shirts, caps, ties, badges. 2000 emblems, personal initialized buckles, belts, and hundreds of other easy-to-sell items? Sales kit furnished. Please write today. Hook-Fast Company, Box 480PM, Roanoke, Va.

"BAGS" Cups, napkins, etc. Buy here cheap! Big profits selling from car or truck to grocers, restaurants. Wholesale catalogue. "American Paper Company," Washington 2-C, D. C.

POPCORN Machines, all electric units, peanut roasters, caramelcorn, heating appliances. Northside Sales, Indianapolis, Indiana.

NEW Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 28 E. Jackson, Dept. 17, Chicago 4, Ill.

BIG Money taking orders. Shirts, ties, socks, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-AN Lincoln, Chicago.

EDUCATIONAL AND INSTRUCTION

LEARN Diesel mechanics for higher pay. Actual shop training in our up to date Chicago shops. Approved for veterans and civilians. Established 1902. Free information. Green Shop Training, Dept. 10-C, 460 South State Street, Chicago 5, Illinois.

MEDICAL Laboratory technicians in great demand. We train you in your own home. Catalogue free. Imperial Technical Institute, Box 973-J, Austin, Texas.

WIN A well-paid job in travel—step into a new world of glamorous opportunity! Today more Americans are "going places" than ever before in history. As a result—the hotel and institutional field is surging ahead to new prosperity. Successful Lewis graduates are "making good" everywhere in luxurious hotels, fashionable resorts, smart restaurants, and clubs. Free book explains how to qualify at home for a well-paid position in this ever-growing business where you are not dropped because you are over 40—shows how you are registered free of extra cost in the Lewis National Placement Service. Course approved for veterans training. Write today, Room PD-395, Lewis Hotel Training School, Washington 7, D. C. (Now in its 33rd year.)

LEARN Auctioneering by mail. Twenty copyrighted lessons and recordings. Sample lesson sent free. Diploma. Nelson Auction School, Renville, Minn.

"HOW To Break and Train Horses"—A book every farmer and horseman should have. It is free, no obligation. Simply address, Beery School of Horsemanship, Dept. 1104, Pleasant Hill, Ohio.

EXPORT! Learn at home from established world trader. Big paying positions. Your own profitable world-wide business by mail order without capital; or travel abroad. Experience unnecessary. Free booklet. Mellingen, 104W, Los Angeles 24, Calif.

BE A real estate broker through home study or classroom instruction. Write for free book. Approved for veterans. Weaver School of Real Estate, 15 E. Pershing Rd., Box CP-4, Kansas City 8, Mo.

PLY Trade for Christ. Write Divine Word Missionary Brothers, Conesus, New York.

USED Correspondence courses and educational books bought, sold, rented, catalog free. Educational Exchange, Summerville, Ga.

EARN High wages. Learn body and fender by actual work in our up to date Chicago shops. Approved for veterans and civilians. Established 1902. Free information. Green Shop Training, Dept. 10-C, 460 South State Street, Chicago 5, Illinois.

NOW You can learn the slide rule under an experienced teacher. Previous knowledge of mathematics not necessary. Satisfaction or refund. Tech. Teacher, P.O. Box 1195-C, Jacksonville, Florida.

OIL Painting courses. Simplified home study. Beginners, artists, seaside vacation pupils. Technocratic School of Color, Box PM, York Harbor, Maine.

HOW To get what you want with a winning personality, revealed in our easy home-study plan. Results first lesson. Write today for free lecture and full details. No obligation. Personal Psychologist, Inc., 1008 Washington Bldg., Louisville 2, Ky.

BIBLE Course free. Write: Victory Service, Dept. 449PM, Emmaus, Penna.

WANTED Art courses. International and other good used correspondence courses. Bought. Sold. Rented. Baker, 5509-B Winthrop, Chicago 40.

DENTAL Technician's practice kit. Artificial teeth, plastic, etc. Instructions included. Grant Laboratory, S-219 W. 7th, Los Angeles, Calif.

LAW Home-study (LL.B. degree) on 150-lesson, three-year college course. First lesson, \$1.00. Osborne University, San Bernardino, California.

ENGRAVING And designing. \$1.00 starts you on first lesson. Renzelman, 510 Seybold Building, Miami 36, Florida.

MAGICIANS School. Licensed, first of its kind. Approved for veterans. Free particulars. Dept. ME449, Chavez College of Magic, 729 West Ninth Street, Los Angeles 15, California.

MAKE Up to \$30-\$40 week as a trained practical nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. M-4, Chicago.

PHOTOGRAPHIC Mind! Amaze, earn, learn! Facts, figures, names stick like burrs with Supermemory. Write Thor Books, Mt. Box 1210, Chicago.

LEARN Spanish quickly, easily. Simplified lessons. Details free. Personal Counseling, Box 1411, St. Petersburg, Fla.

NOW You can have an office. Many earn up to \$5,000-\$15,000 annually in the collection business. Learn by home study course, experience unnecessary. Write for free bulletin. No obligation. Franklin Credit School, Dept. 228-D, Roanoke 7, Virginia.

ADVERTISING—You can shortcut experience with my practical advertising formulas. There's big money in advertising. First lesson and information free. The Ad-Man, 817 17th St., Room 331, Denver 2, Colo.

\$100.00 WEEKLY. Servicing, repairing radiators. Home study. Radiatorman, Hayward, Wis.

HOME Bible course. Simple, helpful, instructive. Total cost \$4.00 includes textbooks, stationery, examinations, certificate, \$1.00 starts you, or simply request prospectus. The Bible Study School, 378 Van Hoyten Street, Paterson 1, N. J.

BE A mathematical wizard. Add columns instantly. Free details. Vanderdrift, 517 Lincoln Place, Orange 2, New Jersey.

PIANO Tuning pays. Learn this profitable profession at home. Our Tonometer and mechanical aids make learning easy. No knowledge music necessary. Diploma granted. Largest and oldest school—50th year, G.I. approved. Write for booklet. Niles Bryant School, 78 Bryant Bldg., Washington 16, D.C.

INVESTIGATOR Training. Phillips Secret Service, 1917B North Kenneth, Chicago 39, Illinois.

BOOKKEEPERS! Increase your earnings! Operate your own simplified "Dollar-A-Week" bookkeeping and tax service. Full or spare time. Details free. No obligation. Ellis, Box 200, Cedar Grove, North Carolina.

SCIENCE Of memory simplified. Free booklet "Memory Development." Memorology Club, 2016 Sunnyside Ave., Chicago 25, Ill.

USED Correspondence courses and books bought, sold, rented and exchanged. Catalog free. Lee Mountain, Pisgah, Alabama.

LEARN Photo-engraving at home or in oldest, largest school in America. Work for newspaper or establish own profitable business. New Tasope' Photo-Engraving equipment available soon. Write for information. Veterans ask about G.I. training. The Aurora School of Photo-Engraving, Tasope' Bldg., Aurora, Mo.

SECRET Investigation. Experience unnecessary. Investigators particulars free. George Wagner, M 125 West 86th, New York.

LINGUAPHONE Makes languages easy. At home learn to speak Spanish, Portuguese, Italian, French, German, Russian, by quick, easy Linguaphone Conversational Method. Save time, work, money. Linguaphone correspondence courses are available to veterans under G.I. bill of rights. Send for free book. State if G.I. Linguaphone Institute, 83 RCA Bldg., New York 20, N. Y.

PLAYS, STORIES, MANUSCRIPTS

I WANT New writers to cash checks offered daily. The easiest way to write for pay. No previous experience necessary. Free details. Saunders M. Cummings, 468-11 Independence Bldg., Colorado Springs, Colo.

BUSINESS SERVICE

HOLLYWOOD Remail service, or what? Everson, Box 133, Los Angeles 25, Calif.

CHICAGO Mail address. Receiving. Forwarding. Strictly confidential. Send \$1 monthly. Faultless, P3439 Michigan, Chicago 16.

FLORIDA Mailing address. Letters received, forwarded. Three postcards 25c. Personal Counseling, Box 1411, St. Petersburg, Fla.

INCORPORATE Your business, free details. Tax Research Bureau, Inc., Delaware Trust Building, Wilmington, Delaware.

SPECIAL SERVICES

ADDRESSING. Typing, sealing, stamping, folding, mailing, etc. Done quickly, neatly. Price list sent on request. Clark Letter Shop, 801 W. Fulton St., Grand Rapids 4, Michigan.

REFRIGERATION Questions answered. 25¢ per group. Warco, 2699W Coolidge, Oakland 1, Calif.

WORKING And detail drawings made. Engineering services. Send sketch or specifications for estimate. Engineer Associates, Dept. A, 155 Cobb Ave., Decatur, Ill.

AUTHORS. Attention! Do you have stories you would like a movie company to accept? If so, have them typed, send to me together with \$10 for each story. I will correct it, including any necessary retyping, then send to any company whose address you give me. Russell C. Hempstead, 10 Lincoln St., Oxford, Mich.

WE Receive, remail letters; \$3.00 monthly or 25¢ each. "Hawkins," 1300 Taylor, Washington, D. C.

TREASURES In your closet! Do you have worthless bank books, insurance policies or stock certificates in some forgotten drawer? They may be worth a fortune! Let us investigate for you. Write today. National Evaluators, P.O. Box 5852, Cleveland 1, Ohio.

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FOREIGN Employment for you. Excellent permanent job opportunities for U. S. citizens. Wages at least 20% higher, less taxation, lower living costs. Improved social position. Transportation and housing furnished. Choice of climate and location. South and Central America, Far East, China, Alaska, Australia, New Zealand, Africa. Send \$1.00 for copyrighted digest showing oil, shipping, construction, mining, etc., companies working and hiring. Includes sample application letter, advice on wages, tips, etc. World Wide Company, Dept. PM-4, Madison 1, Wisconsin.

RELIABLE Information, facts, figures about California. Housing, working conditions, etc. \$1.00. Glen E. Middagh, 2378 Sutter St., San Francisco, Calif.

CARTOONING, COMMERCIAL ART, SHOWCARD WRITING, SIGN PAINTING

BE A showcard writer. Learn at home in three weeks. Uncrowded. Big money field. Makes sales very first week. Write. R. J. Meissner, 1539 Wisconsin Ave., Dept. 12, Flint 6, Michigan.

ANIMATED Cartooning. Prepare for television. \$2.00 is all you pay for complete course. Cartoonimator, 5029 Illinois N.W., Washington 11, D.C.

COMIC Pen and ink sketch made from your photograph. Picture returned unharmed. State hobby or pastime. Send photo and \$1 to Baker Allmond, R-2, Windsor, Virginia.

"HOW To Make Money With Simple Cartoons"—a book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 94-C, Pleasant Hill, Ohio.

CHALK Talk booklet, \$1; plus cartoon course. chalk, paper, Studio, Box 114, Carlton Hill, N. J.

SIGN Painting taught at home. Test lesson free. Ben Kerns, Box 812-T, Greenville, S. C.

9 ALPHABET & NUMERAL pattern sets and catalog, \$1.00. Sign Letter Distributors, P.O. Box 101, Mineola, N. Y.

EARN Money evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1-B, Wisconsin.

LEARN Professional lettering in one week by amazing new mechanical process. Complete instruction manual, 300 designs \$1.25. Major-Art System, 3510-D Palmer, Chicago 47.

DRAFTING And artists' material catalog, thousands of items. 25¢ (deductible first \$2 order). Draftsmen's, 187 Madison, Chicago.

NEW Style home study course in advertising art now ready. Free portfolio "Your Career in Art." Applied Art Studio, 1662 Lincoln Avenue, Cleveland 7, Ohio.

CHALK Talks. Laugh producing program, \$1.00. Catalog 10c. Balda The Cartoonist, Oshkosh, Wisconsin.

ADVERTISING AGENCIES, LETTER WRITERS, FOR ADVERTISERS

ATTENTION. Advertisers, mail order men. Now available—Choice Canadian mailing lists, Dominion wide, \$5.00 per 2000. Satisfaction guaranteed. Robert Kirkwood, 377 Dundas West, Toronto, Ontario, Canada.

TEXAS—24 Words, 50 weeklies, \$3.75. Pennebaker Adv. Service, Box 141, San Marcos, Texas.

MAILING Lists guaranteed, fresh names \$5.00 per thousand. Gonzalez, Bradbury Building, Los Angeles 13, California.

BETTER Letters produce better business. Write for our guaranteed \$1.00 trial offer. Ace Service, 20 East Jackson, Chicago 4.

INCREASE Your mail order sales. Sell to the farm market. Let us show you what others are doing. Free information. Farm Journal, 201 Farm Journal Building, Philadelphia 5, Penna.

ADVERTISERS! Reach nearly 18,000,000 readers. 25 Sunday national key newspapers, 18 words, \$51.50. "Terrific pullers," 20 popular newspapers, \$10.00. "Free booklet." Special—One inch display 2-821, 1949 circulation, \$48.30. Newmark's Advertising Agency, (Established 1893), 217-7th Ave., New York 11.

ADVERTISE: 24 Words, 40 newspapers \$3.50. Lists free. Advertising Bureau, 10511-C Springfield, Chicago 43.

24 WORDS In 50 weeklies, \$4.95. J. Darnell, 730 Hays, Jackson, Tennessee.

ADS Placed in out of town newspapers and magazines. Low rates. Catalogue free. Ideas that pay. Baker Advertising Agency, Successors Ankrum Agency, 189 W. Madison, Chicago 2.

MAILING Lists, certified, productive, inexpensive, \$5.00 1000. Homeworkers, agents, buyers, etc. Write Dixie Service, King, N. C.

RUBBER STAMPS AND OFFICE SUPPLIES

3 LINES, cushioned, indexed, 55c. Pads 35c. Printright, Wauwatosa, Wis.

RUBBER Stamps. Send for catalog. Excello, Box 580, Shreveport, Louisiana.

3 LINES, 50c, 125 Letterheads, 125 envelopes printed, \$1.98. 1949 catalogue. Johnson Press, Box 6-A, New York City 26.

TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

STANDARD Typewriters \$17.50; duplicators \$12.50; adders \$12.50. Nationwide service. Typewritery, 118 Spruce, Wichita, Kansas.

REVOLUTIONARY New addressing machine works without plates. Only \$30.47 postpaid, complete with supplies. Satisfaction guaranteed. Free folder. Time Saver Co., Dept. PM-D, 542 S. Dearborn St., Chicago 5, Ill.

SELL Addressing machine \$24.50. No plates. No stencils. Exclusive territory available. Mail Addresser, San Marcos 5, Texas.

PRINT-O-MATIC Selffeeding post card stencil printing duplicator \$13.50. All office machines. Supplies. Bargains. Type-write for free literature. Pittsburgh Typewriter Supply, 338-7 Fourth Avenue, Pittsburgh 22, Penna.

RECONDITIONED Typewriters, mimeograph, multigraph printing devices, appliances, supplies. Catalog. Dixiegraph Service, King, N. Carolina.

PRINTING, MULTIGRAPHING, MIMEOGRAPHING, GUMMED LABELS

BUSINESS. Personal stationery, state requirements. Samples. Herbert Hudson, Centredale, R. I.

PRINTING \$1.00 Up. Professionally designed modern arrangements. Special types, rule, etc. M. R. Taylor, 262 E. 4th St., New York City 9.

500 SHIPPING Labels 2¹/₄ x 2³/₄, \$1.25, 2 x 3 two color \$2.25. Myers Company, 1228 Adams, Owosso 1, Michigan.

LOW Cost business stationery. Samples. Crow, 533 18th St., Huntington 3, W. Va.

BUSINESS. Personal stationery. State requirements. Samples. Mero Products, 100 Morrison, Punxsutawney, Penna.

PERSONAL Postals. Handy, economical. Sample. Printing, Box 262, Easton, Penna.

ADVERTISING Postcard specialist! "Anything printed." Foster's, Box 240B, Oklahoma City 8, Okla.

MIMEOGRAPHING Experts. Samples free. Martin Mimeographing, 3212 Harper, Saint Louis, Missouri.

1000 BUSINESS Cards \$2.50 prepaid, samples free. Reliable Print Shop, 905 East Jefferson, Louisville 8, Ky.

10 DUPLICATE Pads (1,000 sheets) \$2.95—4"x7", your specifications. Smalley, 32 Wyoming, Tunkhannock, Penna.

400 8¹/₂ x 5¹/₂ LETTERHEADS \$1.35. Mango, 555-A South 20th, Newark 3, N.J.

WATERMARKED Bond—5¹/₂x8¹/₂ statements, letterheads or invoices, 1000—\$3.75; 5000—\$10.00, business cards, 1000—\$2.25. 25 years experience. Peters Associates, Troy, Ohio.

MIMEOGRAPHING 100 8¹/₂x11 \$1.10. Additional hundreds 50c. Mimeographing, Madison, Tenn.

BETTER Printing at reasonable prices. Send requirements. Free samples sent upon request. Mills Burnham, Highland, N. Abington, Massachusetts.

5000 6 x 9 CIRCULARS \$16.00 Postpaid. Samples free. Journal Printing Co., Newark, Ark.

SAVE Money on your printing. Write today for new, low price list and offset ordering chart PM-1 free. We photograph your copy and reproduce it on white or colored paper. Advertisers Service Litho, 161 W. Harrison, Chicago 5, Illinois.

GEND 10c Now, for our 48 page 1949 price list—refunded first order. McCall Press, 1326 South 27th, Omaha, Nebraska.

500 3x2¹/₄ FOUR Line gummed stickers 35c; red border 50c. Moritz Printery, Saginaw, Mich.

QUALITY Printing—Reasonable prices. Fast service on catalogs, folders, publications. Write for prices. Bagby Printing Co., Georgetown, Ohio.

MIMEOGRAPHING—Letters, price lists, formulas, instructions. Lowest prices. Lem's Letter Shop, 5710 Stanton, Detroit 8.

PRINTING OUTFITS AND SUPPLIES

PRINTING Presses, type, supplies. Details free. Kelsey Presses, K-11, Meriden, Conn.

MAKE Your own plastic printing cuts. New Plexiplate Process. Plexiservice, Argyle 1, Wisconsin.

HOMECRAFT Presses, supplies. Catalog 10c, refundable. Riegel, 1111 Harrison, Philadelphia 24, Penna.

PRINTING Presses, type, supplies. Lists 3c. Turnbaugh Service, Loysville, Penna.

INEXPENSIVE Home-made printing press. Details free. Novelty Shop, Downsville, Louisiana.

PATENT ATTORNEYS

INVENTORS—Patent laws encourage the development of inventions. The Rules of Practice of the U. S. Patent Office advises—unless an inventor is familiar with such matters—that he employ a competent registered attorney or registered agent, as the value of patents depends largely upon the skillful preparation of the specifications and claims. Write for further particulars as to patent protection and procedure and "Invention Record" form at once. No obligation. McMorrow, Berman & Davidson, Registered Patent Attorneys, 1345 Victor Building, Washington 1, D. C.

INVENTORS: Learn how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practise before the U.S. Patent Office and prepared to serve you in handling your patent matters. "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request—without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 91B-D District National Building, Washington, D. C.

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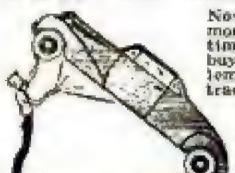


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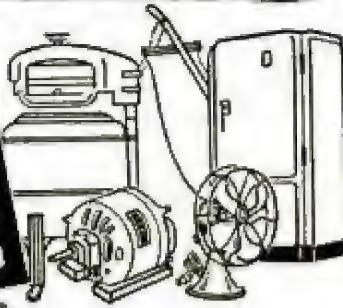
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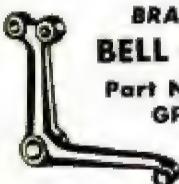
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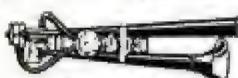
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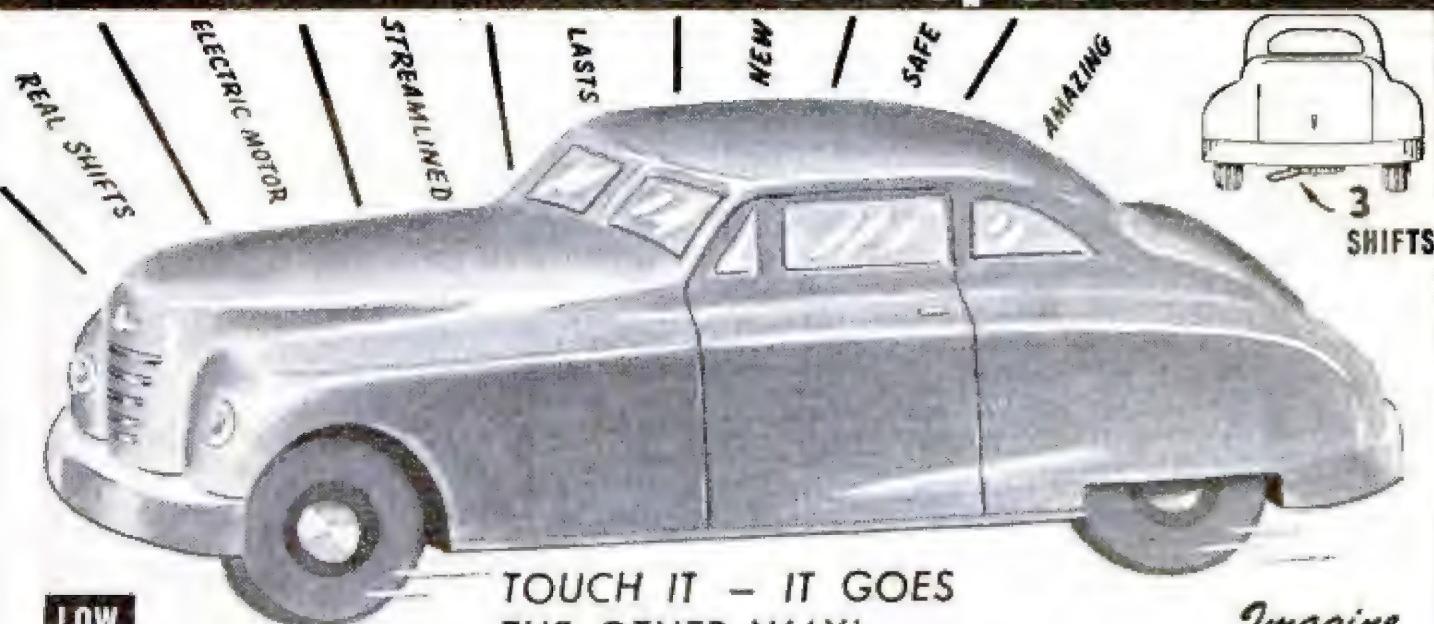
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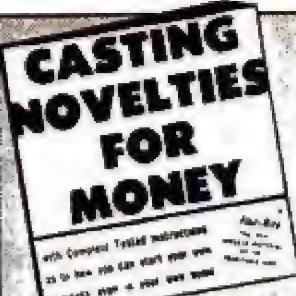
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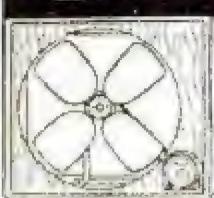
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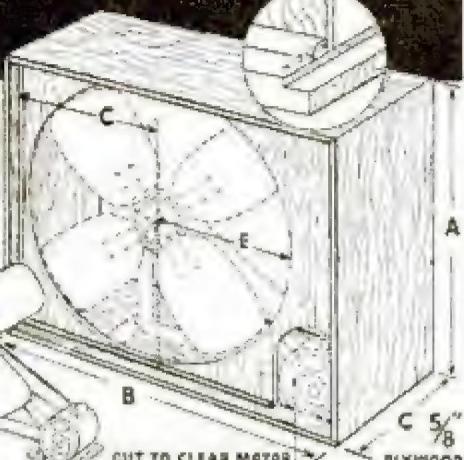
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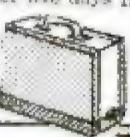
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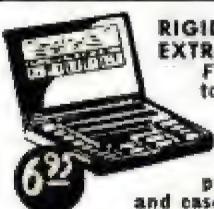


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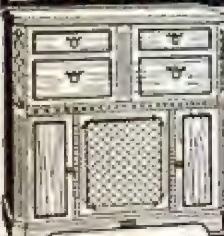
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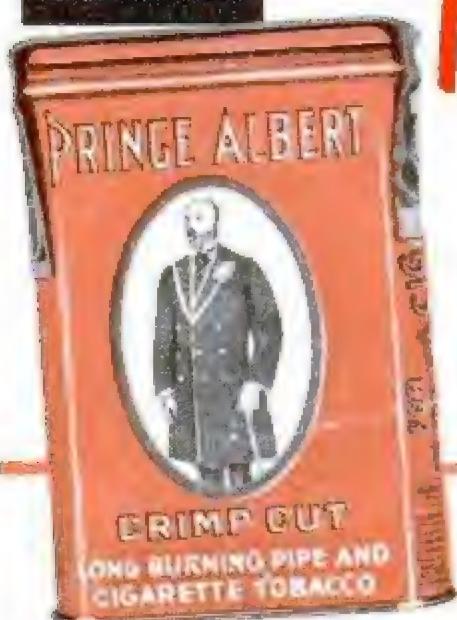
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APRIL
1949

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 91 NO. 4

we built a cabin for **\$300**

Photos by John Hobbs

"It gave me real pleasure to straddle a hefty log and square it into a corner post with a sharp adz"

By Norman E. Chaplin

THE CABIN cost us less than \$300. Double that amount and convert it into a year-round cottage. When we started to build there were innumerable obstacles to overcome, but having considerably more courage and energy than money, we got what we wanted and boast of our success.

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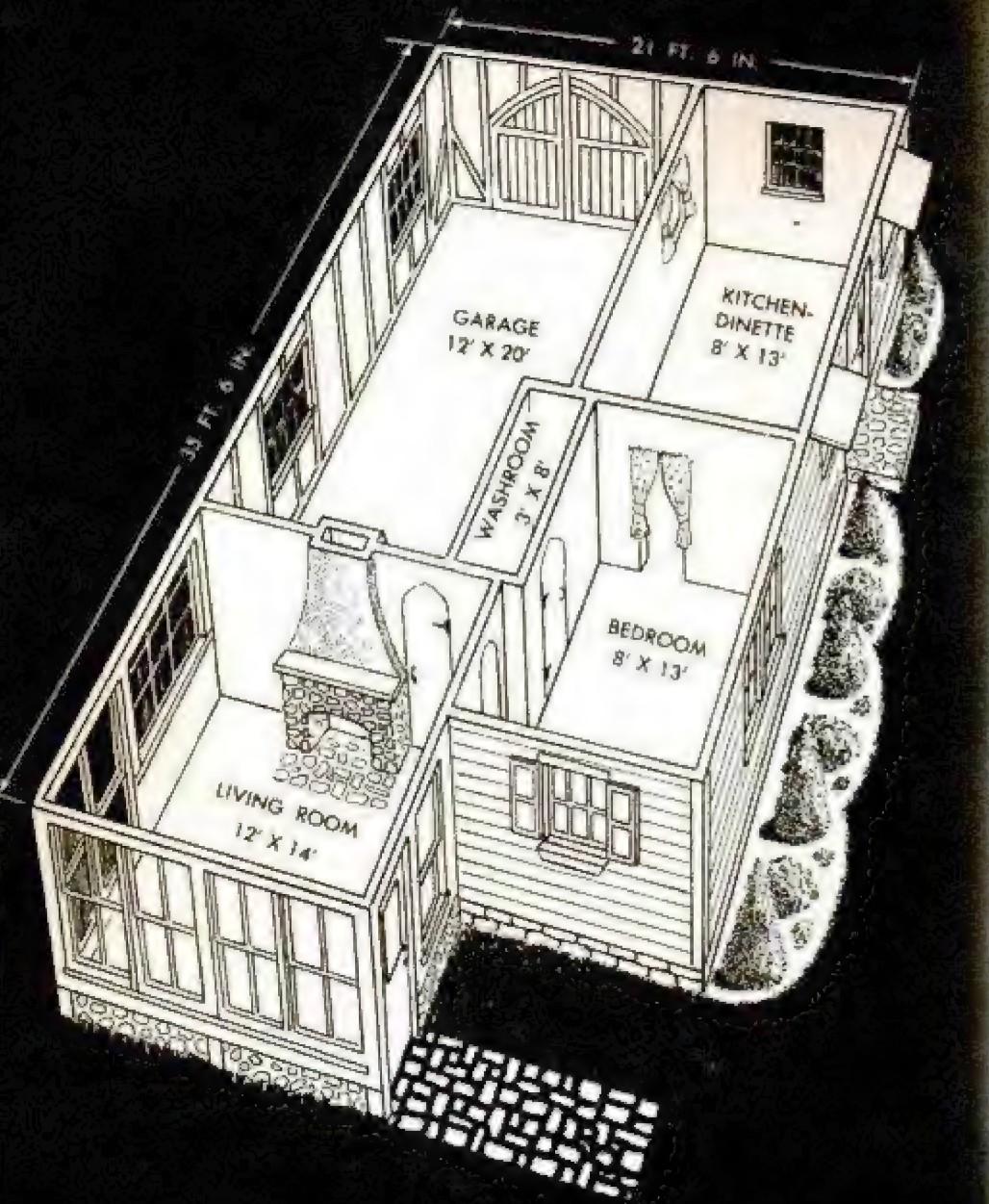
similarly, depending upon the intensity of the urge that drives one into action. If you are not afraid of hard work, if you can hit a nail on the head, keep to a straight line with a saw, and know how to use a square and level, and if you have the will to keep on the job until it is completed, such a house is yours.

There are several points I wish to stress. The first is a never-say-die attitude.

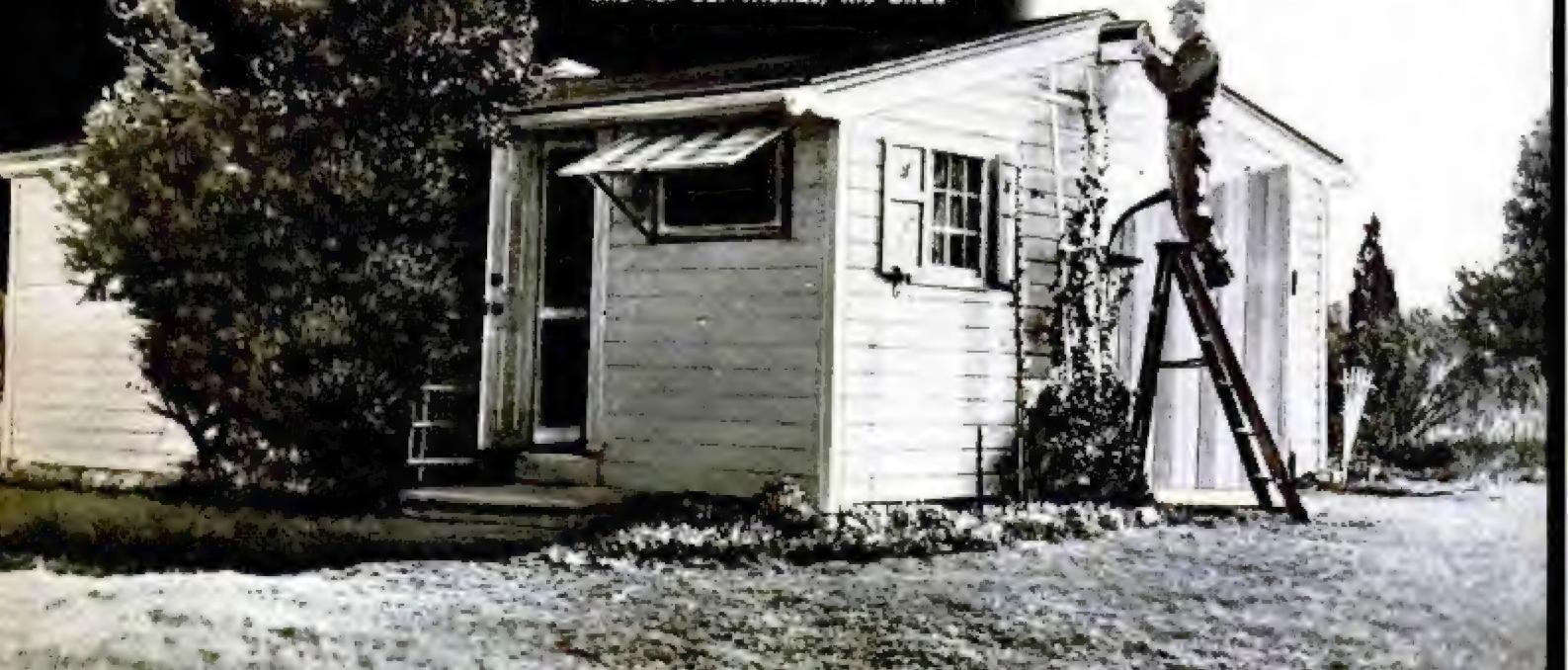
Second, the cottage, though small and

"We painted our cabin white. Seven storm windows in our living room give us a view that can't be beat"





"We first built up the kitchen-dinette, bedroom and garage. A garage was a necessity, for we needed storage room for boats and tools. Later we added the living room and washroom. Below, when the cabin was almost finished I nailed up another new summer home, this one for our friends, the birds."



built by amateurs at a minimum cost, need not be cheap or shacklike in appearance. Our \$300 cabin does not suffer in comparison with the \$7000 house next door, because we planned to make every feature the best possible before we dug the first hole. And this without an architect. Decide what you want in your house and then study magazine and newspaper plans. They may show pretentious or humble homes. Good ideas are everywhere.

We thought first of building a four-room cottage until we learned of the scarcity of building materials. The only builder considering the job gave us a figure of \$4000 for a summer cabin. This estimate, so far beyond what we had anticipated, tended to crystallize our independence. From then on we were concerned with the problems of a builder as well as an owner.

The plans were cut to three rooms and bath. A garage was included, for we needed a place for boats, tools, wood and the odds and ends that accumulate around a cabin. Planning means more than arranging floor space. The land, the morning sun, the sunsets, the summer breezes, the winter storms,



"For trim I used pine slabs costing a dollar a trailer load, cutting and planing them into lumber myself."

trees already available for landscaping, the best view of the ocean—these points and more were discussed and decisions made. The cabin, in spite of its simplicity, must be original in design, attractive and quaint. This is an important resolve. Do not build a "haphazard" cottage. The thoughtful touches that change a shack into a charming cottage cost little money. The effort and time spent on such touches produce results that are incalculable.

The cottage was placed close to the ground, closed in underneath with field stones laid in cement, which made a tight and attractive "cellar" wall. The stones were available without cost—found in the gutters of our newly laid streets and in stone walls placed at our disposal by interested friends. The cost of the cement was insignificant. The cottage itself is low-studded and rambling. The street wall is almost 50 percent garage door. When painting this, we experimented in order to unify the house and garage. We painted stripes of yellow and white on the doors, the rest of the building white. Over the doors hangs a birdhouse occupied each

spring by a family of wrens. Yellow shutters decorated with hand-painted ducks and held back with black S-hinges, and yellow flower boxes frame the 6 and 12-light windows. There are trellises on each side of the garage doors for honeysuckle and clematis.

The upper two panels of the kitchen door have the appearance of bull's-eye glass (done with paints), another touch of the unusual. At the same door a trellis, covered with morning-glories, hides the water pipes and drain.

When we were ready to build, no new lumber could be found. Secondhand lumber, high-priced and poor in quality, was ruled out. We searched for a building, which we ourselves might raze, and found a surprisingly large assortment—ex-service stations, roadside stands and old farm sheds. Many were low in price provided we did the moving. We finally purchased a collapsed summer cabin made of siding. For \$50 we acquired the cabin and such standing timber as we might need to replace sills and plate.

We sawed the walls of the cabin into



"Our cabin will never be finished, it seems. Now, I'm dummying up a glassed-in cupola that will give us a towering view of the sea"

4-by-8-foot sections—the largest size that would fit on our homemade trailer—and carted them to our own land, a beautiful spot overlooking the ocean near Plymouth, Mass. It was hard work and occupied all our spare time that first fall. Our determination never faltered, although we were sorely tried at times. There was an evening drive, after an all-day struggle with wrecking bars, saws and hammers, when the smell of burning rubber warned me of trouble. A few minutes later a trailer tire blew out. In order to mend the tube and shoe, every stick of lumber on the trailer had to be removed, piled at the side of the road and later repacked, this

time so none of the timbers could rub against the revolving wheel and thus burn another hole in the tire.

Pulling up floor boards with a nail remover to preserve as far as possible the utility of all lumber was slow work, but satisfactory. My wife removed the nails which my tool had lifted from the framing, and later she marked the sections to facilitate the reassembling on the homesite. Our floor plan had to be adapted to the lumber available without sacrificing "class and distinction." At long last we dumped our heterogeneous assortment of materials on the chosen land.

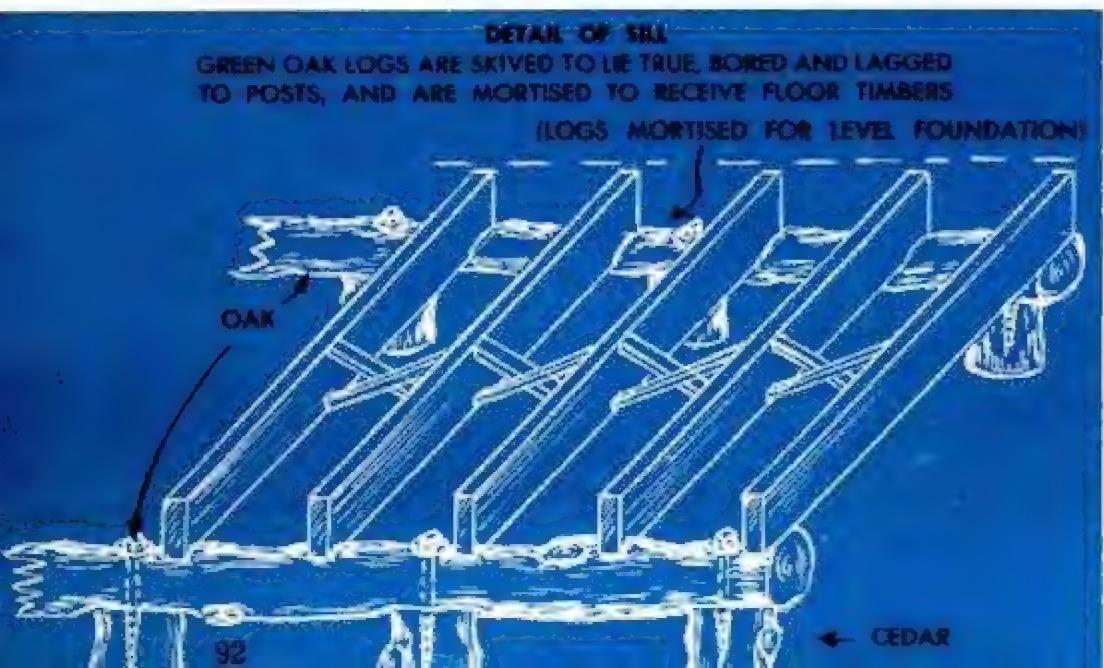
When we finally took stock we realized that there was not enough good material to establish the old cabin on the new site because of rot and wreckage. So we obtained more lumber, not from lumberyards, but from the woods where hurricane logs were still available. This meant carting them on our

trailer to a mill and having them cut into one-inch boards and some two-by-fours. Then we cut oak logs for sills and corner posts, and some cedar for posts. At last we were ready to start building.

Cedar posts, free for the chopping and lasting a lifetime, became our foundation. Challenged now by the builder's estimate, we determined to go ahead on the principle that no money would be spent unless absolutely necessary. We intended to prove that determination could overcome all difficulties, even financial ones.

To save a tree and still keep within the building restrictions, we had some difficulty in placing the cottage just where we

wanted it. But at last the first holes were dug and the posts for kitchen and bedroom were embedded in concrete. Several months later, when we were ready to add on the garage, we had to kindle bonfires to thaw out the frozen ground. The sills came next. Although several sizable timbers had been salvaged from the old cabin, we





"Our total wiring costs were \$18, including an old ship's lantern I electrified and hung outside on a cedar post"



decided that green oak would make a more lasting framework. We used six eight-inch logs, squared into shape with an adz. I had always wanted to try my hand with an adz, and the money spent on this good tool was never regretted. There is no greater satisfaction than to straddle a hefty log and with judicious strokes, square the timber. Seasoned oak is granitelike in hardness, but the green oak was fashioned into sills and girders without too great effort.

Because of the windy location, I took the precaution of boring the sills and fastening them to the corner posts with lag screws and bolts. No hurricane would lift my cabin from its foundation! The erection of the wall sections came next. We used four-by-fours for corner posts. Maneuvering to maintain the original contour, I patched and rebuilt the framing, making doubly sure of the strength of every timber and joist. The day we raised our first corner post and fitted to it, at right angles, two wall sections of the kitchen, the rain came down in torrents. We had both looked forward to this

(Continued to page 258)

"One end of our living room is completely enclosed with glass. We poured a smooth concrete floor and marked it off like a compass card. At the opposite end is our sure-drawing fireplace with back and arch made of brick. We laid up a facing with field stones"





High-Speed Saw Blade Melts Steel As It Cuts

Heavy sections of structural steel are cut at a rate of 13 feet a minute by a 60-inch saw blade that literally melts away the steel. When the blade, the teeth of which travel faster than 320 miles an hour, makes contact with the tough steel, friction generates heat more rapidly than the material can absorb it. This intense heat melts the surface and the saw teeth carry it away. The operator controls the saw remotely from behind a transparent plastic shield.



Ultrasonic Therapy

Sounds 20 times higher than the top frequency that humans can hear are being tested in therapy treatments for several physical ailments. The sounds are in the ultrasonic region, 143 times higher than the top note of a piano. Dr. G. J. Thiessen of the National Research Council, Ottawa, Can., has developed a therapy instrument that pipes the sounds through a flexible cable and applies them to the affected body area. An electronic generator produces a 600,000-cycle note which is carried to a ground-quartz crystal. It is the crystal which vibrates and is applied to the patient. Although the tests have been inconclusive as yet, ultrasonic therapy shows promise of effectively treating several ailments including asthma, sinus, neuralgia, sciatica, lumbago and sprains.



Lifter Handles Truck Tires

One man can easily lift a heavy truck tire and roll it into position with the aid of a lever tool equipped with casters. The tool has two arms with a wheel on each arm. Parallel with the arms are two rollers mounted on swivel brackets. The lifter is shoved under the tire and the handle elevated. The brackets swing so that the lift is always straight up and there is no tendency for the tire to slip off. After the wheel has been rolled into position it is rotated until it is aligned with the wheel studs. The lifter handles any tire from 6.00-16 to 11.00-22 with a maximum lifting effort of only 25 pounds.



Homemade Automobile Has Engine in Middle

Built by a South Carolina mechanic in his spare time, an unusual looking automobile has its engine in the middle. He originally intended to make the car a rear-engine model, but was unable to get the proper parts and had to place the engine just ahead of the rear axle. Because of the central location of the engine, which is connected to the differential by a 17-inch drive shaft, there is no room for a rear seat. A large luggage area is provided behind the engine compartment. The car goes from 20 to 24 miles on a gallon and cruises at 55 miles an hour.

Back-Seat Clothes Rack for Car Doesn't Obstruct Driver's Vision

Without obstructing the driver's view to the rear, a clamp-on clothes rack for automobiles holds six or more suits. No screws are used to install the rack. It clamps to the window frames on each side of the rear seat. A turnbuckle in the center of the rack adjusts it to the proper width. The rod can also be used to suspend a baby basket or hammock. To remove the rack, you merely loosen the turnbuckle.



Jeep Becomes Streamlined Sedan

Push-button doors and windows are featured on a completely streamlined jeep made by an Army officer on duty in Japan. Using the jeep chassis, Major Donald C. Surles of Cisco, Tex., built himself the ultramodern vehicle at a cost of \$2000. The original power plant is used. The doors slide upward into the roof when a button is pushed.

Sugar-Beet Harvester

Up to six tons of sugar beets an hour are harvested by a tractor-drawn machine that does everything from topping and cleaning the beets to loading them in a truck. After being cleaned, the topped beets are carried up an elevator and dropped on a sorting belt. Two men, standing on the machine, sort the beets from clods and trash, dropping them into a trailer cart that has its own elevating chain for unloading the crop into a truck. Once removed from the soil, the beets never touch the ground.



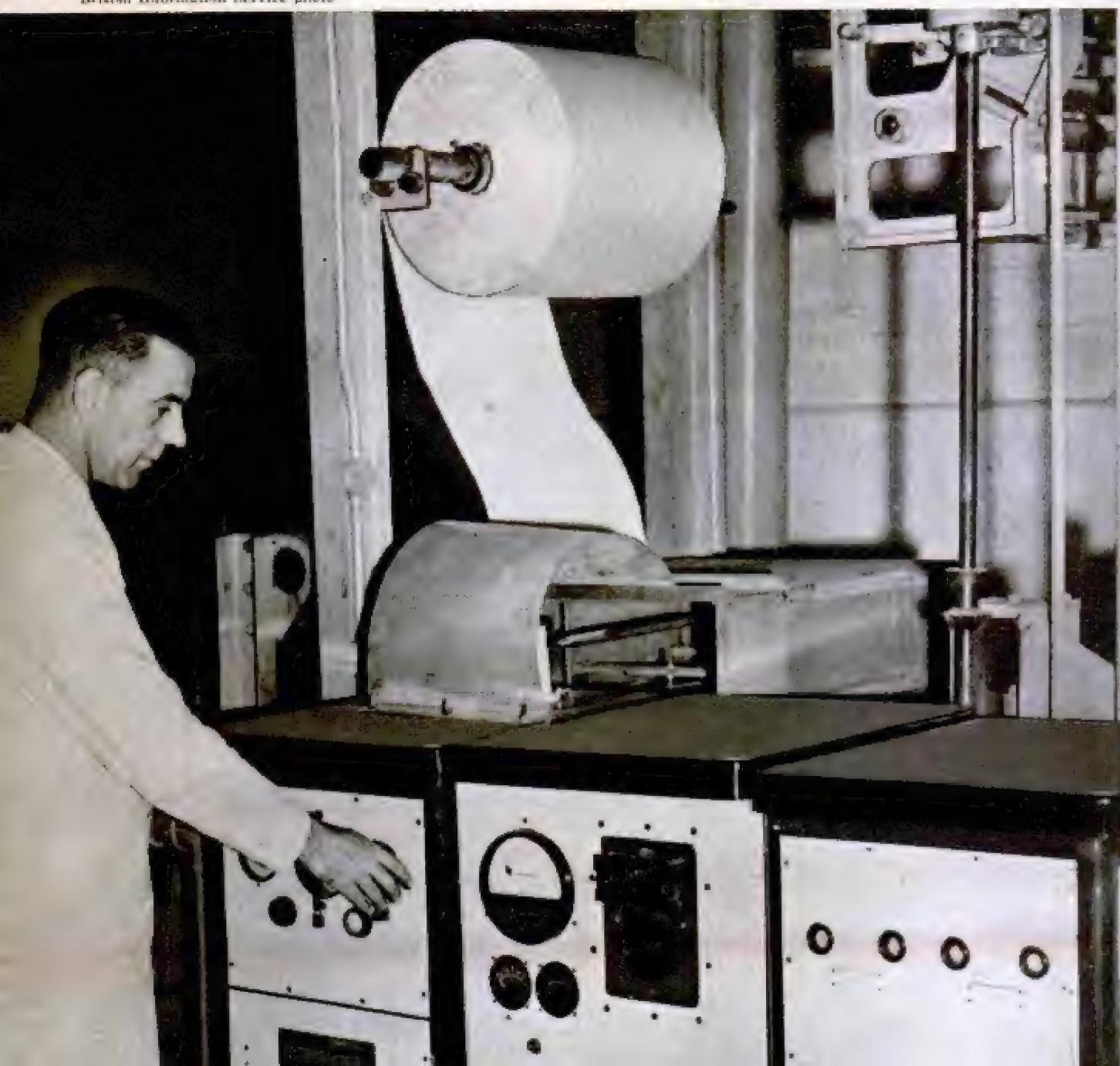
Rolling Out Man-Made Lumber

COMPRESSED sawdust board is being made by a British firm in continuous lengths and at one third the usual cost of manufacturing artificial lumber. The experimental English plant will be replaced this fall by a full-size one turning out board approximately four feet wide and $\frac{1}{8}$ to $\frac{3}{4}$ inch thick. Sawdust and resin are fed into a hopper, mixed and heated by high-frequency radio waves. It is then bonded by a pressure of 250 pounds to the square inch, at a temperature kept at 175 degrees Centigrade by infrared heat. Corrugated metal grooves the board to permit the escape of air bubbles when a final outer layer of paper or veneer is applied.

Artificially made lumber rolls out on the metal cutting table at speed of 8 to 10 feet per minute

Radio waves generated by apparatus in foreground heat sawdust-and-resin mixture prior to the bonding

British Information Service photo



WALLBOARD CAN BE MADE IN LENGTHS UP TO 60 FEET

ROTARY SAW

LOWER PRESSURE BOILERS

**SAWDUST
FROM MILLS -
WASHES DOWN
WATER TO DINE**

**DRIER REMOVES
MOISTURE
FROM SAWDUST**

ROTATING DRUM MIXES DRIED SAWDUST WITH RESIN

PAPER COVERING
FOR UPPER SIDE
OF BOARD

THIN METAL PLATE WITH
MINUTE CORRUGATIONS HELPS
BOND PAPER TO BOARD

**CHUTE BRINGS
PREPARED SAWDUST AND
RESIN FROM HOPPER**

PAPER FOR
LOWER SIDE
OF BOARD

SAWDUST VIBRATOR

LAYER OF PREPARED
SAWDUST AND RESIN
PASSING INTO MACHINE

**CONTROL
PANELS.**
**FIVE-
HORSEPOWER
ELECTRIC
MOTOR**

CHANGE-SPEED
BOX

**VARIABLE
RATIO
GEARBOX**

DOTTED LINE INDICATES
PATH OF BOARD
DURING MANUFACTURE

INFRARED HEATER AIDS FINAL BONDING OF SAWDUST AND RESIN UNDER PRESSURE

BOARD PASSES BETWEEN ROLLERS
AT 8 TO 10 FEET PER MINUTE,
DEPENDING ON THICKNESS.

The diagram illustrates the paper-making process. A large upper roller at the top rotates clockwise, indicated by a curved arrow. A smaller lower roller at the bottom rotates counter-clockwise, indicated by a curved arrow. Between the two rollers, a continuous blue line represents the 'PAPER WEB' being formed. The upper roller is supported by several blue cylindrical bearings. To the left of the upper roller, a 'GAS SUPPLY LINE' is shown with an arrow pointing towards it. On the right side, there are two blue rectangular components labeled 'UPPER CORRUGATED METAL PLATE' and 'LOWER CORRUGATED METAL PLATE'. Below the upper roller, a horizontal dashed line labeled 'SAWDUST AND RESIN' with an arrow points towards the center. At the bottom, another horizontal dashed line labeled 'LOWER PAPER' with an arrow points upwards. The lower roller is also supported by blue cylindrical bearings. The entire assembly is set against a light blue background.

**HOW SAWDUST-AND-RESIN MIXTURE PASSING
BETWEEN ROLLERS UNDER PRESSURE OF APPROXIMATELY 250
POUNDS TO THE SQUARE INCH BECOMES BONDED INTO BOARD**



After landing on a nearby lake, fire fighters hike overland with their equipment to scene of the fire



Forest fire rolls through timber near Lady Evelyn, Ont. Plane bearing the firemen wings in for a landing

Flying Fire Fighters



↑ Fire pump is set up to carry water from the nearest stream. Seaplanes carry all the equipment as well as the fire fighters. Below, portable equipment is loaded aboard one of the planes for quick trip above forest

The whine of a plane engine has replaced the sound of a fire siren in northern Ontario. Fire fighters wing their way above the tall forests in seaplanes, land on one of the countless lakes or rivers that dot the province and hike the short distance to the fire scene. Time is vital in fighting forest fires—if a fire gets out of control it may rage across hundreds of miles of fine timber. Thirty pilots and 25 air engineers operate the 30 planes of the fire-fighting service, taking off from 23 bases strategically located across northern Ontario. The service patrols more than 360,000 square miles of terrain. The planes also are used for detection of fires as a supplement to observers in lookout towers. The Ontario service is one of the largest aerial fire-fighting services in the world and is credited with saving thousands of acres of forest each year by fast transportation of men and equipment to the scene of a fire.





Precision-Casting Process Based on Wartime Technique

Using a technique developed in wartime when airplane super-charger buckets were precision-cast, Allis-Chalmers is now eliminating many machining operations by casting small, but intricate, parts for its products. These parts are cast so precisely that, although they were formerly machined, no machining is necessary. The process is based on the "lost wax" technique. Wax patterns are produced by injecting melted wax into metal dies. The wax pattern is removed and a refractory material poured around it and allowed to harden. Then the wax is melted and drained from the mold. Molten metal is poured into the cavity from which the wax was removed. After cooling for about five hours, the castings are knocked loose by an air hammer.



Top, left, injection molding of wax patterns. Dies are clamped in press and wax pumped in through flexible hose. Right, the molten metal is poured into molds. Above, final inspection of the castings. Parts on table are some produced by new process



"Shrinking" Truck Dumps Load

Loads are carried down between the wheels in a rear-dump wagon called the Tournarocker. Though only $6\frac{1}{2}$ feet high, it has a capacity of $16\frac{1}{2}$ yards or 16 tons. Dumping is done by locking brakes on the rear wheels at the edge of the dump and raising the bowl by an electric motor and cable attached to the rear end of the bowl. This pulls the prime mover back towards the rear wheels, tips the bowl and dumps the load. It has an over-all length of about 26 feet and a 90-degree turning radius.

BACK IN 1849 a lot of people acted in peculiar ways all on account of gold. They sold their homes and made for the prairies, the desert and the high mountains. It was California or bust. Some of them found gold. Others found nothing but black sand in their gold pans. But they kept coming, kept digging, kept chasing the golden rainbow.

A hundred years later, Lloyd D. Sweet of Watsonville, Calif., is hunting for gold, too. But it's an easy-going job to him. Gold is his hobby. If he garners any of the yellow stuff from his mine, he's happy about it. If he doesn't, he isn't bothered much. The reason is that his gold mine is near his summer home and his favorite recreation area. It is about halfway between the historic old mining towns of Downieville and Sierra City.

To reach Sweet's mine, you cross the North Yuba River on a "Flying Dutchman." That's a little wooden seat strung by a pulley on a cable. You pull yourself across stream with a rope. Nearby, among a formation of boulder deposits is the mine. There's a slit dug out of the rocks and built up with smaller stones. The sluice box is set in there. It's a wooden flume with burlap and cleats fastened along the bottom to catch gold washed down from his placer diggings.

Hobby: Mining Gold

**Story and Photos by
Harry De Lasaux**

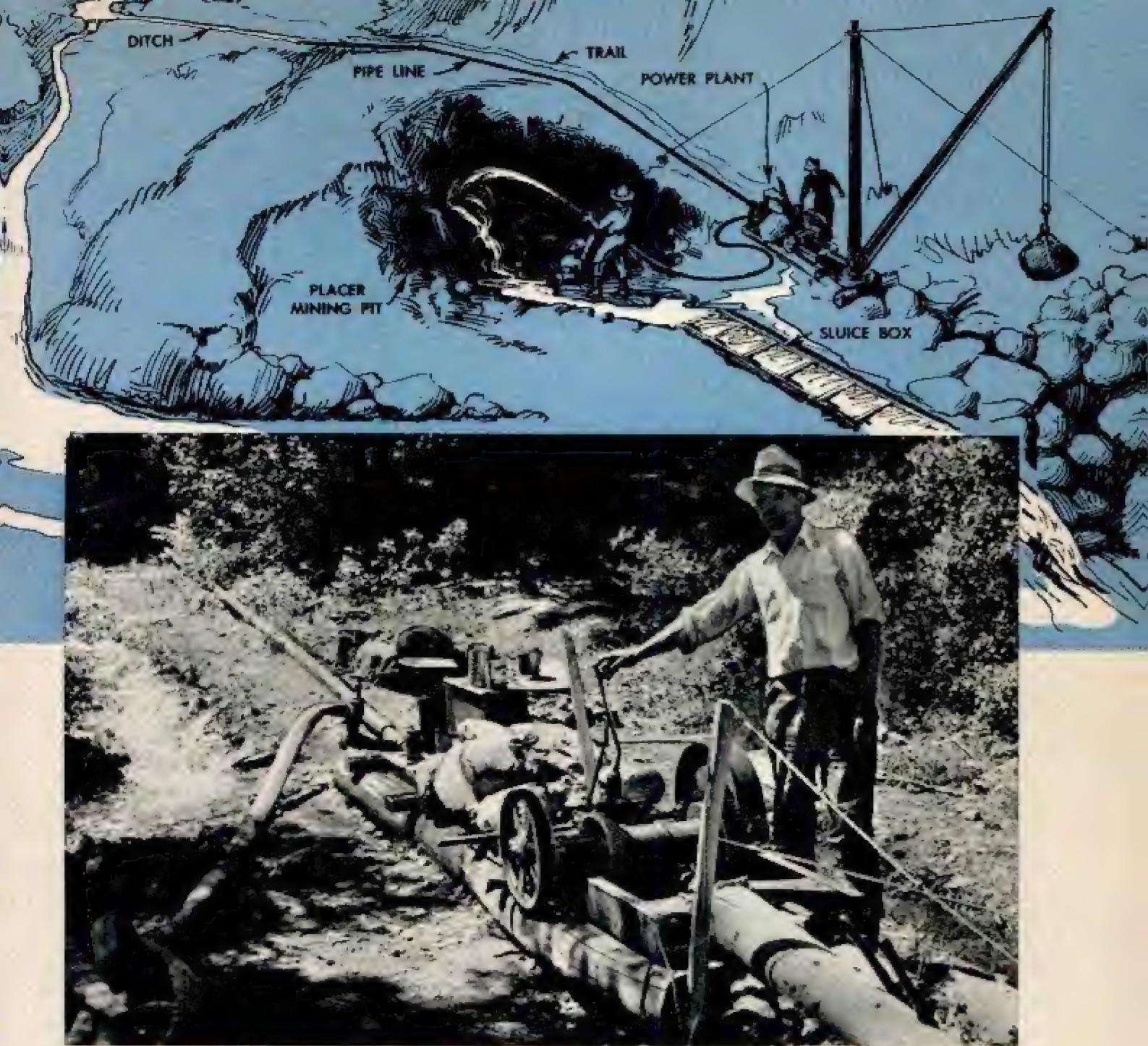
Sweet's cabin is out of sight from the river level, a few hundred feet uphill. In order to build the cabin, Sweet—and Mrs. Sweet—had to clear brush and make a trail. The trail followed an old mining ditch used in the Gold Rush. It led from a nearby creek, a roaring little stream full of deep pools and brilliant falls. Sweet was asked how he secured the land.

"It's government land," he explained. "The country in the national forest areas is available for leasing provided you establish a mining claim. My first discovery of gold here netted me \$15 worth. I mined one nugget shaped like a thumb that was worth \$5. My claim includes the creek, so I'm always sure of plenty of water."

As the project developed, Sweet's talent as a mining engineer unfolded, too. He dug a ditch a quarter of a mile long upstream, dropping it down

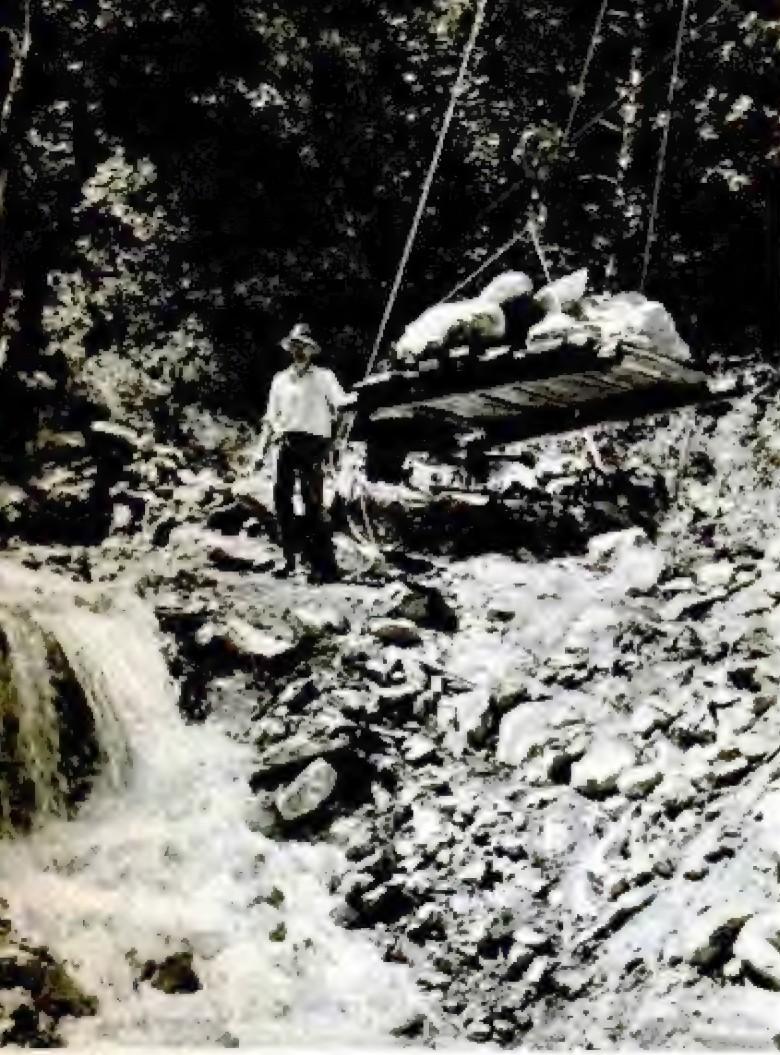
To hurry gold production, Lloyd Sweet uses a fire hose on his water system to wash down the higher gravel banks





Top, sketch shows over-all plan of Sweet's homemade gold mine. Above, winch-and-gear system was built around old Chevrolet transmission. Below, water wheel is turned by gravity-flow stream piped from creek





Jib crane operated by water-power system can lift a ton of boulders out of the diggings. Below, sluice box, lined on bottom with burlap and cleats, catches the gold as rushing waters wash the metal into it



gradually to the river to secure a good gravity flow. This ditch supplied water to wash down the gold-bearing earth and gravels through the sluice box.

Next, he had to have some sort of device to lift out the boulders so he could free the earth and gravel. The Sweets laid a quarter of a mile of three-inch iron pipe along the line of the ditch. This was to supply the water power for his proposed water wheel.

First, he built a Pelton water wheel. It was simply an iron plate, circular in shape, to which were bolted metal cups. He balanced not only the water wheel, but all fast-turning parts. Next, he set the water wheel in a heavy box frame to catch the water flowing from the three-inch pipe. For his cable drum and gear-reduction system, he went to the junk yard and bought an old Chevrolet transmission, from which he took the gearshift and gearbox. He then attached the winch to the power system, rigged up a jib crane and he was ready to move boulders out of the diggings.

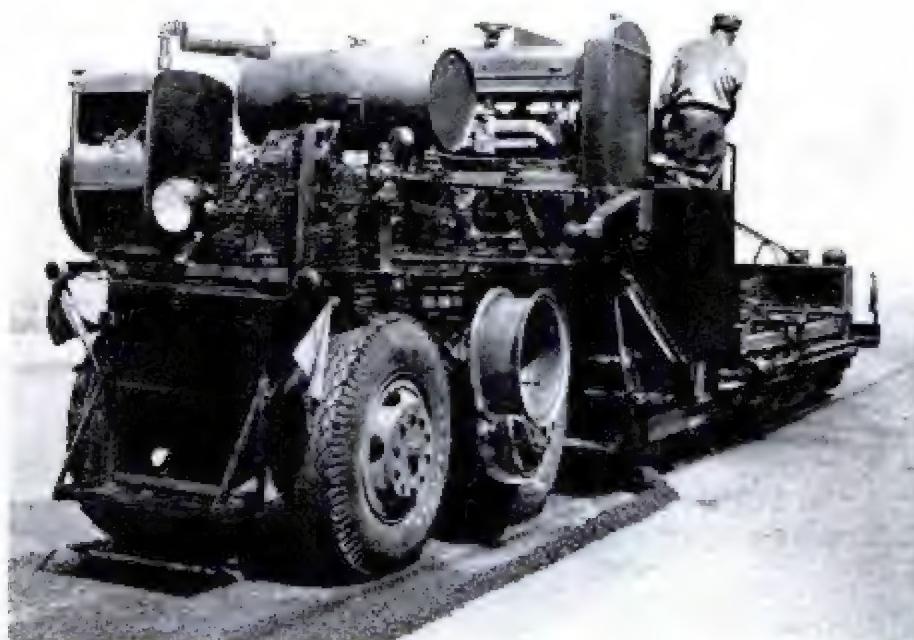
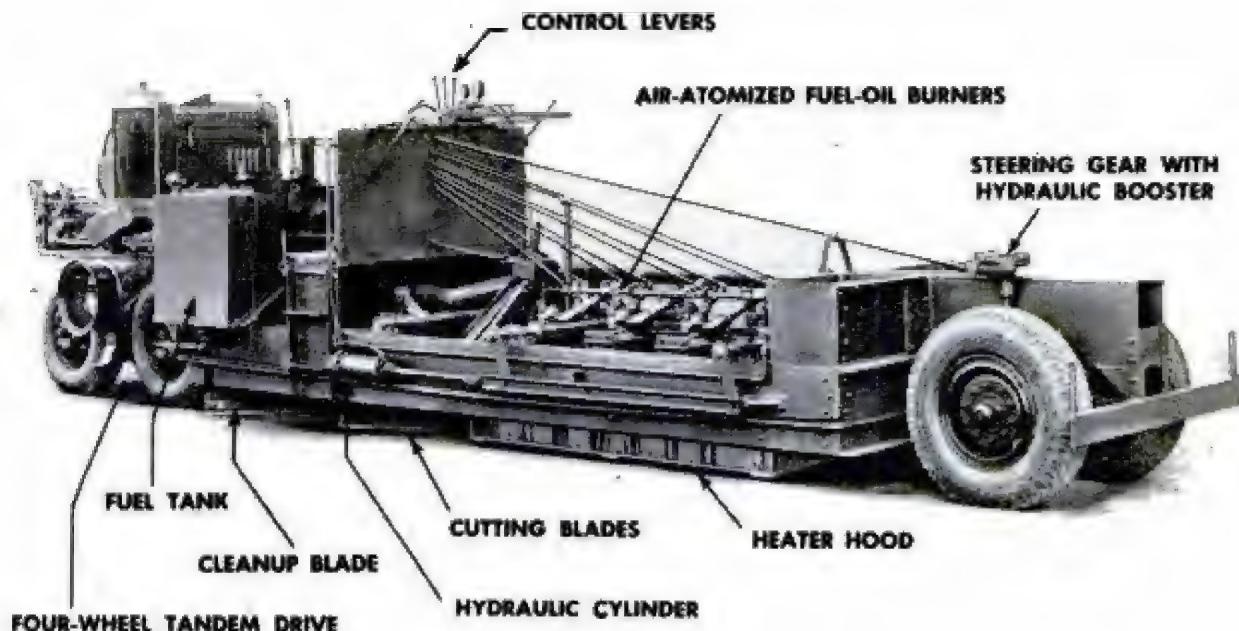
When the ditch from up above is wide open, a flood of water rushes down over his diggings and washes sand and gravel through the sluice box. Occasionally, he stops it long enough to get down in the pit and clean out the boulders.

Just to hurry up the gold-washing process, he also has rigged up a fire hose, and in spare moments he washes down the higher areas of the gravel bank with it.

When visitors ask if he really gets any gold, he produces a piepan with gold concentrates in it. Swirling water around and around in the piepan, he gives it a quick flip like the sourdough miners used to. Instantly, through the layer of black sand in the bottom, there appear several good-sized nuggets.

Sweet also has built a home power plant. A three-inch pipe supplies water power for a second water wheel connected to a generator from an old locomotive. With a hiss and a roar the thing starts up, and in a few seconds the lights go on, the radio works and Mrs. Sweet can start ironing clothes with an electric iron.

Mr. Sweet is in business at Watsonville, a thriving farming town along the California coast a few hours' drive below San Francisco. He's in a position to make frequent trips throughout the year to the Sweet diggings along Sierra County's North Yuba River. It's the land of the '49ers, and the history of the country he enjoys is rich with Gold Rush excitement and drama. Also, the people of that mountain region are friendly and helpful. One old prospector taught him several profitable tricks of gold mining—even showed him how to retort his gold from the quicksilver by using a large raw potato!



Street Planer

Rough asphalt streets are planed smooth by a long vehicle that softens the surface with heat. Fuel-oil burners throw intense heat on the asphalt and, as the machine moves forward, the planing blade scrapes off the high spots, leaving the surface free of corrugations. The rear wheels are within the blade width, riding on planed surface. Under good conditions the planer can smooth 30,000 square yards of pavement per day.

Cranes Lift House And Carry It Away

When W. L. Lipscomb of Victoria, Tex., wanted to remove the second floor of a building and convert it into a separate cottage, he decided the easiest way would be to pick it up and carry it to the new location. He did just that with the aid of two mobile cranes. Not a piece of furniture was disturbed or a single dish broken as the two cranes, working as a team, lifted the upper floor off the building and carried it safely to its new foundation.



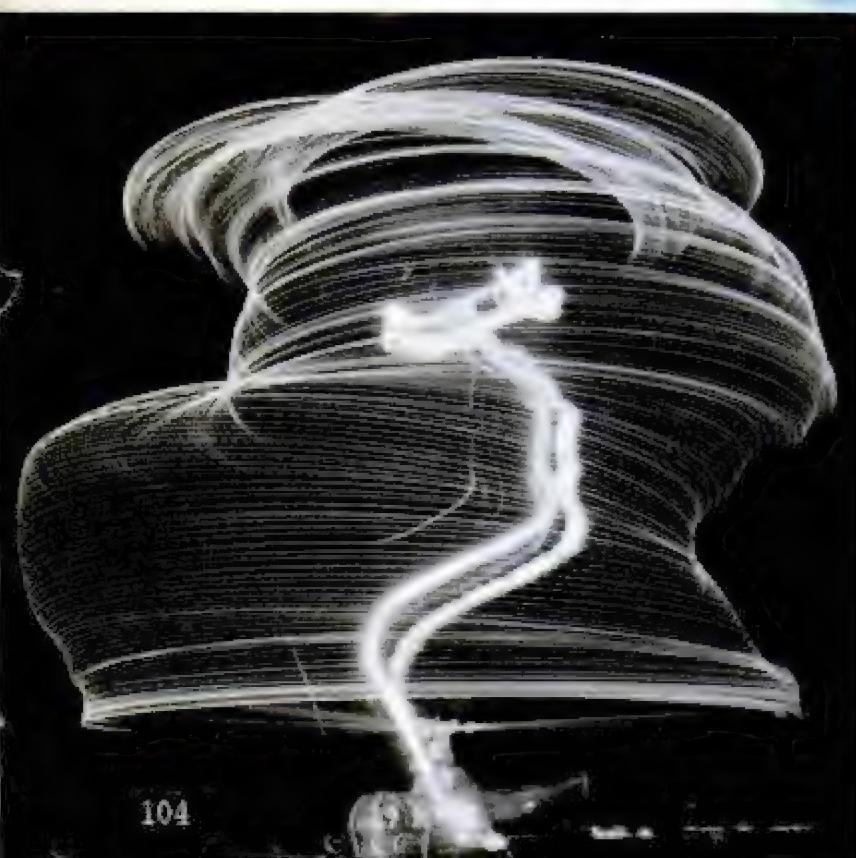


Scale - Inches
0 1 2 3 4 5 6

TRIPS TO THE MOON in rockets are forecast by experiments with a liquid-hydrogen-powered test motor that blasts gases from its exhaust jet at 15,000 miles an hour. No larger than a man's fist, the rocket motor, above, produces a greater thrust than a small airplane engine. White spots in exhaust stream of rocket motor are shock waves through which the gases pass as they are decelerated by the atmosphere. Top, right, the scientists at Ohio State University observe the motor's performance from a control booth outside the test pit. The glass in the observation window is four inches thick. Tests show that liquid hydrogen, used in combination with liquid oxygen, will provide enough energy to overcome the gravitational pull of the earth



TWIN BOOMS and an extra-thick narrow wing distinguish the Anderson Greenwood 14, a two-place pusher plane nearing completion of flight tests. It cruises 110 miles an hour and has a range above 400 miles. A horizontal tail is above the propeller slipstream



WHIRLING PATTERNS are traced in the night sky by lights on rotor-blade tips and fuselage of a helicopter undergoing tests by the U. S. Navy for rescue roles. Its position can be accurately pin-pointed even in the poorest visibility. Initial flight trials were made at Anacostia Air Station in Washington, D. C.



Photo by Kretschmer—FPG

How to Tempt a Fish

PART I

FLY CASTING

THIS IS A STORY of just average fishermen who, because of their choice of proper flies and fly-rod equipment, their knowledge of where to go and what times of day and evening to fish, must hide behind trees when tying flies to their leaders.

Because catching trout, bass, pike, pan fish, walleyes, salmon, landlocked salmon, bonefish, snook, tarpon, jack crevalle and sea trout with fly-fishing gear is so much fun and fly casting is so easy to learn, this sport is gaining tremendously in popularity throughout the sports world.

With about half an hour of coaching, you can learn enough about fly casting to catch numerous species of fresh and salt-water game fish, but it will take many years of conversing with the expert anglers before you will be able to talk like they do. It takes years of rubbing elbows with them at their clubs and in their streams to understand their "fly talk" — but you don't need this until later in life when sittin' beats wadin'.

What counts most is

that electric thrill that goes up the rod, through the palm of your hand, up your arm and into your heart when a fish is on your fly. And another important factor is that friendly feeling you build up inside for those with whom you fish.

There are millions of fishermen who prefer catching fish with a fly rod because it's the sporty way. The purist casts nothing but a dry fly that floats on the surface of the water. Next comes the angler who first tries it dry, then wet to get the big ones that are deeper during the middle of the day, and then dry again for the evening fishing. Third in line is the guy who mostly has in mind that he does not want to visit the commercial fish market on his way home. He goes to the stream, lake or bay fully equipped with dry and wet flies, streamers, nymphs, cork-bodied bugs, spinners, midget spoons, tiny plugs and worms. In public life he is the same fellow who wears both belt and suspenders, but he usually comes home with fish

By Joe Godfrey, Jr.

International authority on fishing, founder and Executive Secretary of The Sportsman's Club of America, founder of The Fishing Hall of Fame and author of several well-known books on fishing



Thread that glistens in ultraviolet light now is used to tie flies that glow even on the cloudiest of days

for the table while some of the others can only say, "The big one got away."

There are many ways of catching fish such as guddling, chumming, soaking and trolley fishing, but here is a list of the highest-approved methods: 1—Dry-fly fishing. 2—Wet-fly fishing. 3—Spinner fishing. 4—Spinning. 5—Bait casting. 6—Trolling with artificials. 7—Trolling with bait. 8—Bobber fishing with bait. 9—Set-line fishing. 10—Net fishing.

You may catch more fish if you reverse

FLIES FOR RAINBOW TROUT: 1—Hair Professor. 2—Lachmann's Refracto Giant May Fly. 3—Edson Light Tiger. 4—Stroud's Silversides. 5—Ambrose Special. 6—Michigan Night Caddis. 7—Black Ghost Streamer. 8—Cains River Scotch Lassie.

the above list, but it won't be as much fun. The sport of fly fishing has in its fold at least two kinds of persons: The serious-minded angler who insists that he did not "catch" an Atlantic salmon, but rather he "killed" it, and he will further tell you why he used a No. 1 Jock Scott fly and on what the salmon were "feeding"; and the average or absent-minded fisherman who "caught" a salmon on something he thinks was a Dusty Miller fly, but he doesn't remember why he selected it or what size it was, and he doesn't care much what the fish were "eating" at the time. He does remember having a heap of fun taking this fish.

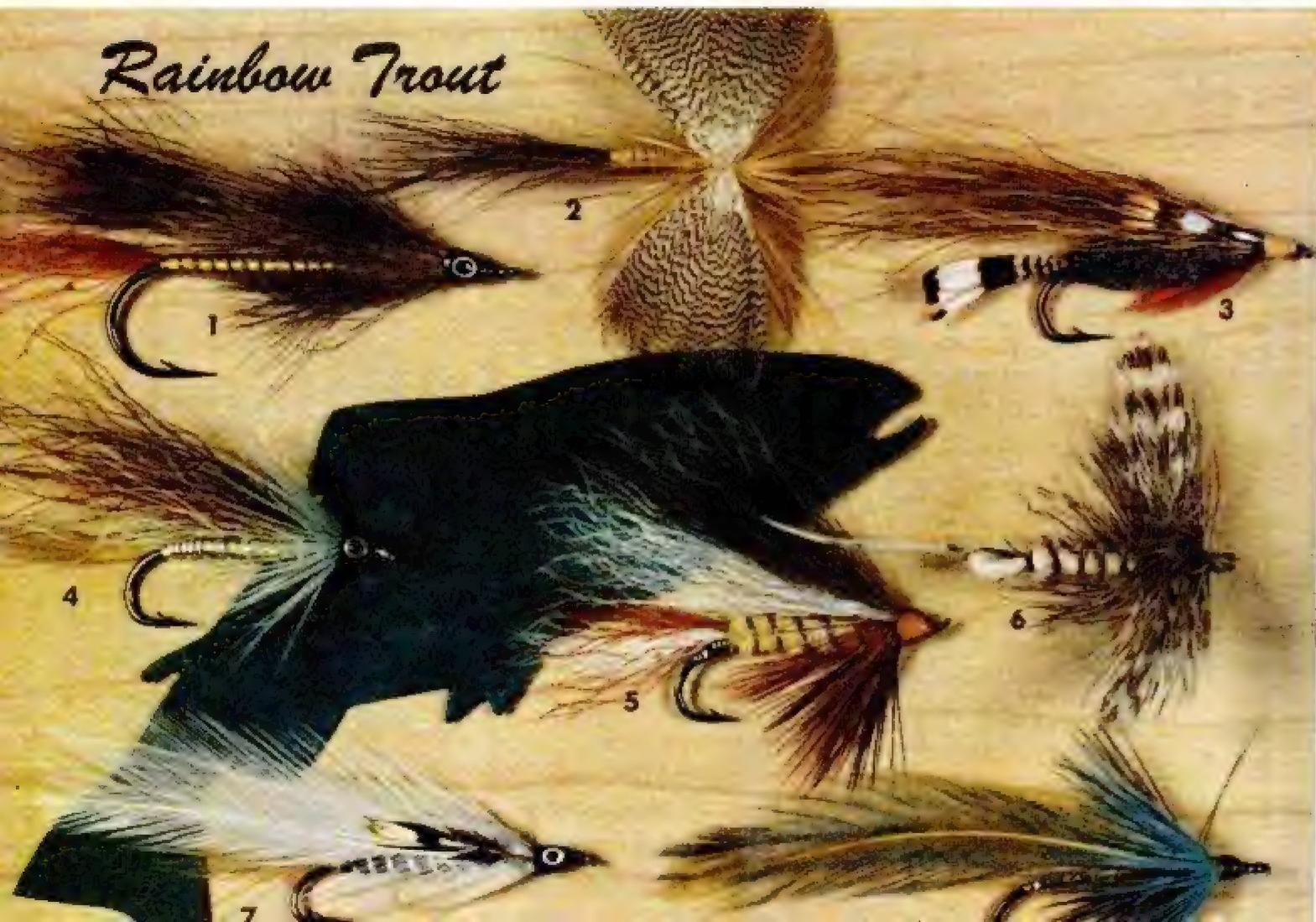
If in your travels you hear anglers telling of their catches (pardon the word "catch" instead of "kill," but these fish were thrown back) and if some of the stories sound exaggerated, go along with these fishermen as though you believed their yarns—provided you reserve your stories for last.

Truth is something more or less unknown in fishing circles because who wants to listen to a little-fish story?

But what part of this fishing business is truthful and where do we draw the line? Well, here it is, and you can count on this information just as you can be sure that fresh-caught walleye is good eating.

It is true that fish grow a lot faster after they are taken from the water. It is not true that fishing is a delusion entirely surrounded by liars in old clothes. It is true

Rainbow Trout

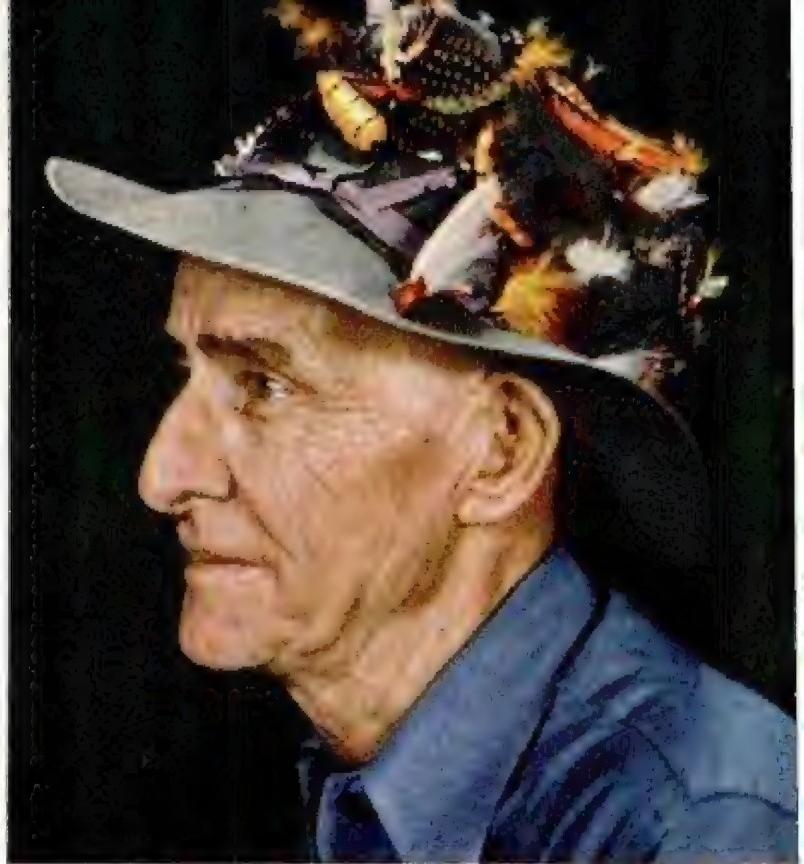


that fishing is a disease for which there is no cure. It is true that opening day is the time when an avalanche of anglers crowds our streams in search of a few scared trout.

It is true that a creel is a wicker basket in which the fly angler carries a fly book, lunch, raincoat, solunar tables, fishing calendar, fish finder, can of worms and one small trout. It is true that a guide is a conservationist in disguise. It is not true that he takes you where they were biting good "last week," that he encourages you to return "next week" when the water will be "lower," "higher," "clearer," "muddier."

It is not true that boots are what you wear to carry large quantities of water and are guaranteed to keep your feet warmer in summer and colder in winter. It is not true that flies are feather or bucktail imitations of nothing ever seen before. It is true that they are the favorite food of moths and are tied especially for decorating fishermen's hats. It is true that plugs are imitations of bees, beetles, birds, bananas, cigars and hula dancers. It is true that "rod" is the name for a fishing pole costing over five dollars. It is said, too, that fly rods are sold by weight—the lighter the rod, the heavier the price. It is true that the worm is greatly scorned in fishing circles but is secretly used by most trout fishermen.

Sir Izaak Walton is the patron saint of the angler. His great contribution to angling



Old-time angler will swear his luck is best when he wears his battered fishing hat. Favorite flies are hooked in the crown, ready for use on the big ones

FLIES FOR ATLANTIC SALMON: 9—Jock Scott. 10—Green Highlander. 11—Pink Lady. 12—Cinnamon Sedge. 13—Brass Hat. 14—Thunder and Lightning. 15—Cahill. 16—Silver Doctor.

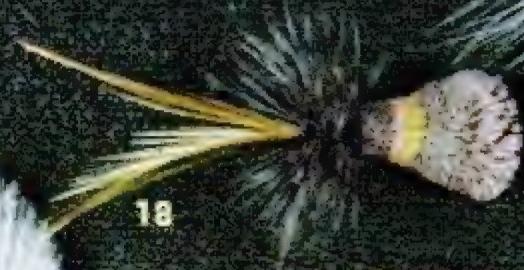
Atlantic Salmon



Smallmouth Bass



17



18

19



20



21



22

23



24



25



26

27



28



29

← **FLIES FOR SMALLMOUTH BASS:**
 17—Red Hopper. 18—Bumble Minnow Gray Yellow. 19—Weber's Whiskerbug. 20—Black and White Bass Houn. 21—Kade's Red and Yellow Ozark. 22—Weber's HOB Streamer. 23—Bill Blade's Streamer. 24—Green Cork Popping Bug. 25—Red Optic Fly. 26—Blade's Hair Hopper. 27—Red and Black Wing Spinner. 28—Parmachene Belle Prescott Spinner. 29—Red and Yellow Mystery Bug.

was his famous book, "The Compleat Angler," first published in 1653. Since that date there have been published some 300 different editions of this work.

In his time there were some good fly casters and excellent fly fishing in England, but since then angling methods both abroad and here have improved so tremendously that today we are faced with the problem of supplying enough fish. There are better-designed fly rods to go with the improved techniques for dry-fly fishing, wet-fly fishing, bass-bug casting and salt-water fly casting. Let's compare. Sir Izaak Walton was content to fish in the streams of the British Isles. Lee Wulff fishes for Atlantic salmon in the waters of Newfoundland, New Brunswick and Nova Scotia, then goes in for giant-tuna fishing in Nova Scotia, then flies his Cub plane to fish for bonefish on the flats of the Florida Keys. He uses the same fly-rod equipment for bonefish that he does for Atlantic salmon, except in the North he uses his own flies called White Wulff and Gray Wulff, but in Florida he uses a fly that looks like a shrimp, tied by Homer Rhode, famous bonefish guide in Miami. Wulff compares the two as follows: "My reactions were geared to the fight of an Atlantic salmon, generally considered top

FLIES FOR BROOK TROUT: 30—Kade's Michigan Hopper. 31—Smedley's Own. 32—Dark Cahill. 33—AK Royal. 34—Cole's Choice. 35—Kade's Woody Royal. 36—AK Gray. 37—Ginger Quill. 38—Brown Wing Royal. 39—Yellow Kade. 40—Yellow Sally. 41—AK Black. 42—Leather Brown. 43—Upstream Wet Cole Fly. 44—Black Prince Streamer. 45—Quill Gordon. 46—Cow Dung. 47—Wisconsin Royal Coachman. 48—Rube Wood Wet. 49—Bucktail Royal Coachman. 50—Salyer's Stone Fly Gray. 51—McGinty Nymph. 52—Bergman's Caddis Grub. 53—Stroud's Carrot Nymph.

Brook Trout





Judicious fisherman will choose a fly that most resembles what the fish are feeding on at that moment

FLIES FOR CRAPPIE: 54—Yellow Bee Trout Bug. 55—Gray Drake. 56—Bluegill Pup. 57—Silver Doctor Polar Bear Fly. 58—Lachmann's Special Gold. 59—Ozark Red and White Bucktail. 60—Antoine's Favorite Hair Wing Fly. 61—Weber's Shinerokle. 62—Playfair Parmachene Belle. 63—Agar Cork Frog. 64—Jeff's Rubber Frog. 65—Schumann's Water Cricket. 66—Plastic Hopper. 67—Rubber Crab.

FLIES FOR TARPOON: (opposite page): 68—Durham Ranger Silver. 69—Yellow Bead Eye. 70—Black and White Tandem Streamer. 71—Red and Yellow Ozark. 72—White Polar and Orange Streamer.

fish in fresh waters. While I could let a salmon take line out between my fingers without having the braided nylon burn me, the speed of the bonefish was much greater. After burning my fingers on that first bonefish run, I let the click act as a brake and watched my fly line melt off the reel arbor. I'm not going to give up Atlantic salmon fishing, but every winter or spring from now on I'll spend some time in the warm salt shallows after bonefish with my fly-casting outfit."

The type of outfit you select for fly fishing is entirely dependent upon the kind of fishing you plan to do. Salmon outfits are bigger, can be used for bonefishing and are good even in the taking of tarpon and sailfish if you are careful. The rod for dry-fly and wet-fly fishing for trout and bass should be 8 or 8½ feet long, with enough stiffness in the body of the rod to give sufficient striking power, but the action of the rod should permit a delicate presentation of the fly.

The fly reel may be simple, single action with a permanent click, with weight enough to balance the rod properly and capacity enough to hold the fly line. The average rule is: The weight of the reel, line and filler and the fly should be about 1½ times the weight of the rod. Automatic reels have become popular because with this reel, slack line, stripped off by hand, can be quickly spooled back on the reel by



pressing the lever with the little finger. When a fish strikes, you can quickly retrieve your loose line and concentrate on playing the fish. There are several semi-automatics that give you finger-tip control.

The fly line is important in casting. In bait casting you depend upon the weight of the lure to get distance, but in fly casting the weight of the line takes out the fly. Here again we have it all over Sir Izaak Walton because we have learned a lot about line finishes, line materials and line tapers. It is possible for the beginner today to step up and cast a fly that goes out like a bullet. Level lines (diameter is uniform throughout its length) are for fly fishing with spinners and live bait. Tapered lines are for longer casts.

Regarding line sizes, just remember that size C line measures .050 inch—subtract or add .005 for each size smaller or larger.

Although there are dozens of good torpedo lines, Marvin Hedge, famous distance caster, developed a seven-taper line that he can throw, without a rod, farther than most anglers can cast a line with the aid of their own fly rods.

When going fly fishing we are often asked three questions: 1—When is the best time to go fly fishing? 2—When should you cast upstream or down? 3—What flies should we select?

Conditions such as muddy waters from heavy rains, falling barometer, moon in the

wrong phase, water temperature too warm are exceptions, but generally speaking the best time to go fishing is whenever you can get away when the season is open, when there is a run on or when the stream is having a hatch of insects. The best hour for brook-trout fishing is in the evening, also for about three hours after sunrise. For rainbows, the evening again and all through the day is generally good. Brown trout bite best at night and are good feeders in early evening. Cutthroats and Dolly Vardens, it seems, are always hungry.

In casting, try to drop your fly in the placid waters of pools or overhanging embankments near swift-running water. Often you can get a strike in quiet waters when the fish won't bite in rapids.

Generally, the quiet waters require you to fish upstream and fast waters make it necessary to fish downstream, but there is more to it, of course. In the East, where streams are more heavily fished, you will find anglers fishing upstream; the same is true in Wisconsin or wherever the fish are shy. In the Western streams, there are more fish and you can fish up or down, depending upon the speed of the current. Edward R. Hewitt, the old master and inventor of the spider fly, finds a real slick piece of water before he tosses his famous spider—upstream. If there is a trout nearby, there is an explosion and the trout is hooked.

In our country, the best way to find out

Tarpon

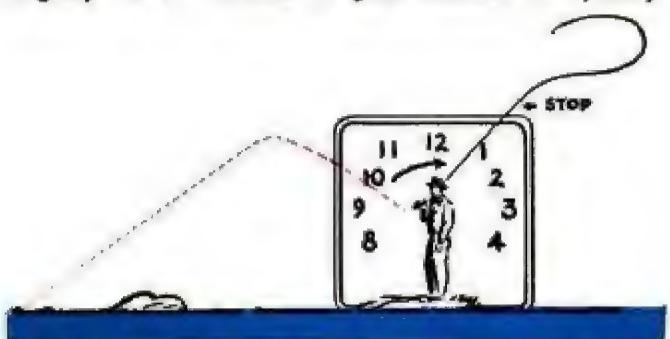
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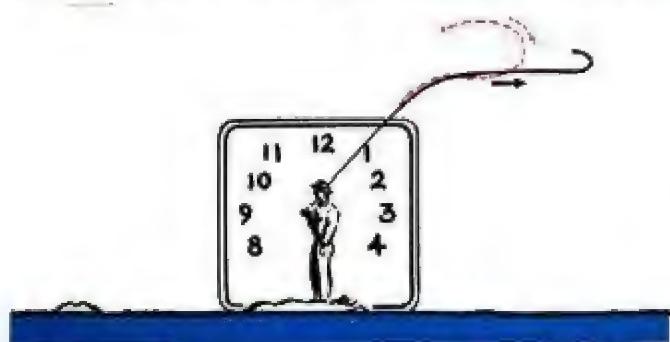
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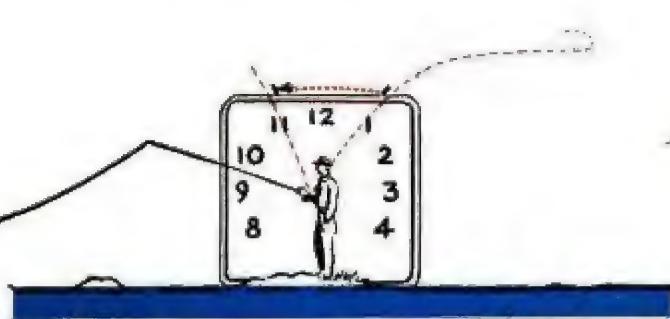
These five "clock" sketches show how to cast with a fly rod. Above, at beginning of cast, lift the rod slightly to 10 o'clock to gain tension for pickup



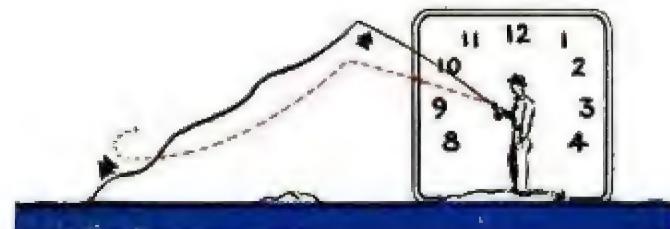
During the pickup, snap the rod tip sharply upward from 10 to 1 o'clock, using a brisk upswing of the forearm without moving the upper arm or shoulder



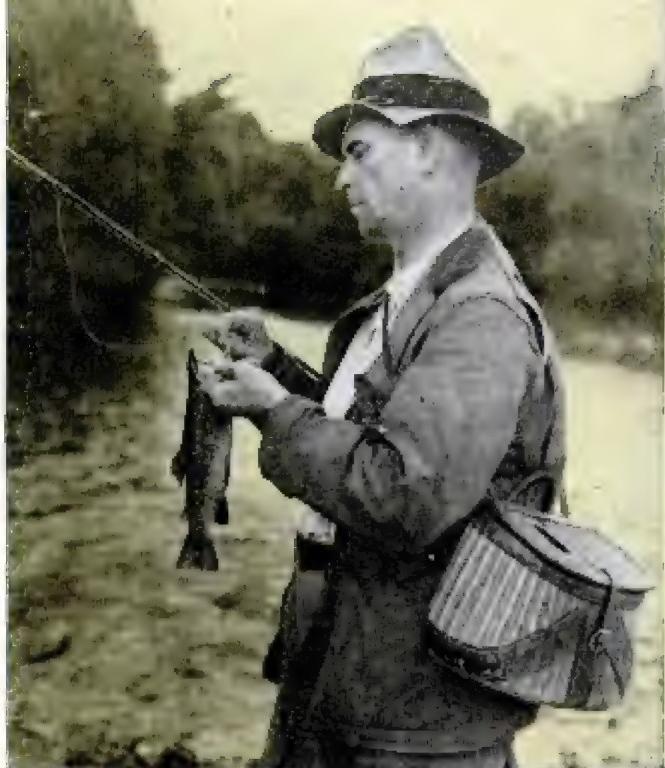
After this back cast, pause for a moment while line continues to move and whips out behind you. This will clear the line and prepare it for forward cast



To cast the line forward again, drive the rod tip forward but not downward, stopping at 9:30 o'clock. Apply power to your cast between 1 and 11 o'clock



In laying the fly, aim three feet above the water target. As the line is about to reach the limit of the cast, raise rod tip slightly so fly hits water first



Most anglers try to appear nonchalant after landing a fighting game fish, but the thrill grows along with the fish as the story is told during winter evenings

the best flies is to ask an angler who has previously fished the waters. Every angler has a pet list of his own. Our most popular fly patterns today are: Royal Coachman, Ginger Quill, Brown Hackle, Parmachene Belle, McGinty, Queen of the Waters, Black Gnat, Gray Hackle, Coachman, Professor.

Most fly fishermen on dark days select darker-colored flies because really all the fish sees is the silhouette, and the surface of the water takes on a silvery color, thus bright flies will not be seen as well. Black Grats, Black Hackle and Black Prince are popular. Bright flies on bright days are always good for rainbows. When going for steelheads, select flies that sink swiftly, preferably flies that have lead or copper-wrapped bodies because these fish are usually well beneath the surface. Spinners are often used, but these drag along the bottom and you are easily hung on a rock, whereas a weighted fly bumps along more on the bottom.

Hook sizes that get the most fish are 10 to 16, but when fishing in streams above 5000 feet you must use smaller flies, usually from 14 to 20 because the natural hatches above this sea-level measurement—drakes and stone flies—are tiny. In the streams of California, Montana, Wyoming and Idaho the anglers prefer sizes 16 or 18. Anglers who want bigger trout often use size 10 flies.

Early season anglers are the ones who must be most particular that their dry fly imitates the natural insect. The hatches

(Continued to page 246)



Bermuda Grass Roots Planter

Bermuda grass roots are planted three times faster than usual by a device that plows, plants and covers in a single operation. It was adapted from a disk plow by Curtis Floyd, agricultural agent of Coal County, Okla. The roots are dropped through a pipe in moist soil behind the lead disk and immediately covered by the second and third disks. It puts roots three or four inches deep to insure better growth.

Infrared Rays Erase Disks For Reuse on Recorder

Sound grooves on plastic dictating disks are erased by heat and infrared rays in a machine about the size of a portable radio. Formerly the disks, made of Vinylite, could be used only once. The machine makes it possible to use the disks at least 25 times. The operator places the recorded disk on a spindle in the machine, presses a button and the recording spins inside a bath of heat and infrared rays. Centrifugal force on the heated plastic erases both sides of the disk simultaneously. The plastic by nature tends to return to its original molded form upon the application of heat. In less than a minute the lid opens automatically and the disk is ready for reuse. The erasing machines are leased to users of large quanti-



Sports Caps With Pockets

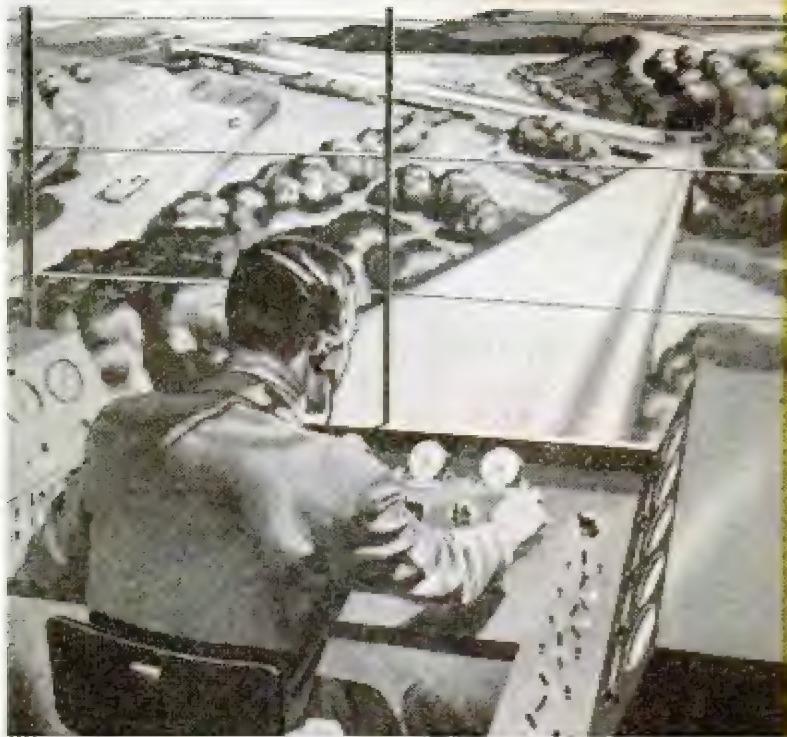
Sports caps are now double-purpose—they not only keep the sun off your head and shade your eyes, but they also serve as convenient pockets for small items that are a nuisance when you're not wearing a coat. One model has a plastic visor with loops for golf tees or fishing flies. A zipper pocket on the front of the crown is a handy place to carry tickets or locker keys when on the beach or golf course.



ties of disks on a 15 and 30-day basis; others can accumulate disks and have them erased at service centers.

130-Mile Belt to Carry Coal and Ore

Snaking through rolling Ohio, twin "rivers" of rubber, flowing in two directions, may be a preview of future railroads



Above, one of five control towers. Below, cutaway of the tube shows how materials are transferred from one belt to the next



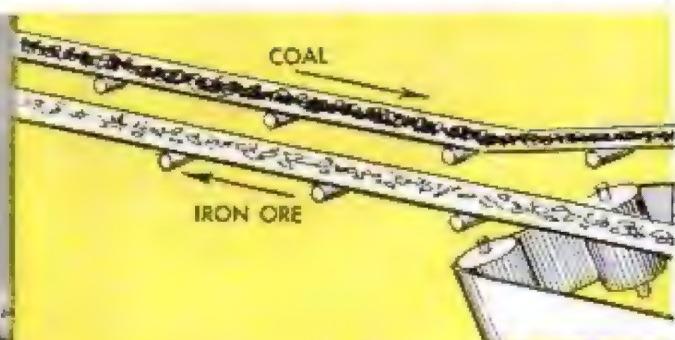
Below, elevated on steel supports, the two-way conveyor will not interfere with highway traffic. The twin belts, enclosed in a metal tube, will have a capacity of 52 million tons yearly

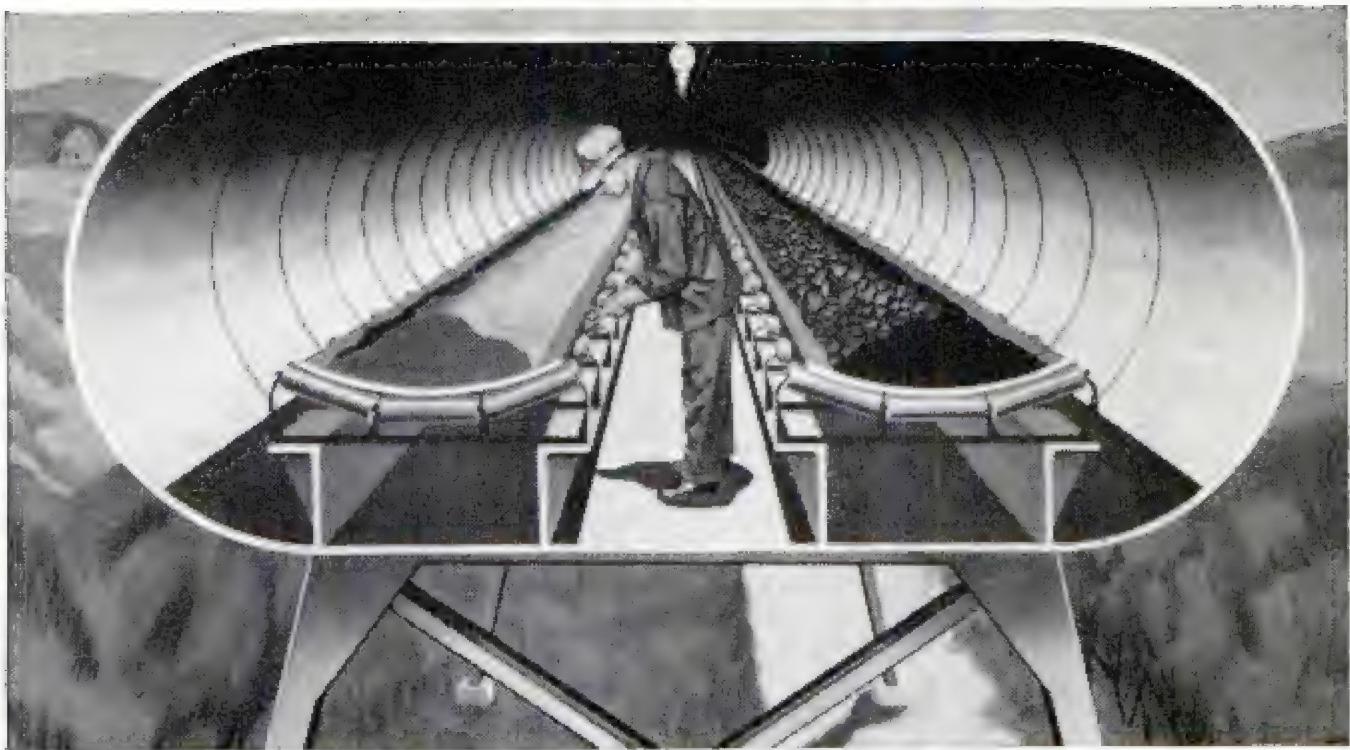


TWIN "RIVERS" that flow uphill and down may be the railroad of tomorrow, if plans for an endless-belt conveyor between Lake Erie and the Ohio River live up to expectations.

The main line of the system, designed to haul millions of tons of coal and ore annually, will be a two-way belt extending 103 miles from Lorain on Lake Erie to the Ohio River near East Liverpool. Spur lines to Youngstown and Cleveland will bring the total up to 130 miles. To move its capacity of 52 million tons a year, the belts will roll 20 hours a day and 300 days a year, saving an estimated 20 to 45 million dollars annually in railroad freight charges.

Mounted on steel supports, the two-way belts will travel in a giant metal tube, flattened on top





Above, conveyor tube has a catwalk for maintenance men. Below, the belt system will run between Lake Erie and the Ohio River

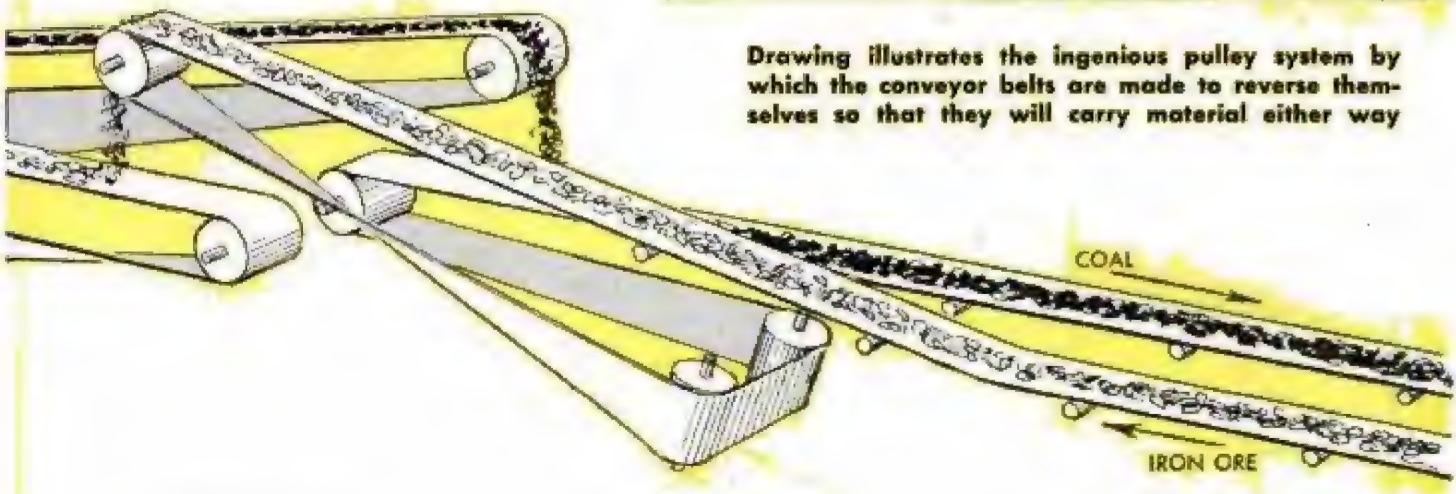
and bottom. To cover the 103 miles from river to lake, 172 belts will be used. Some belts will be over a mile long. A "switchback" pulley system enables the belts to carry loads in either direction.

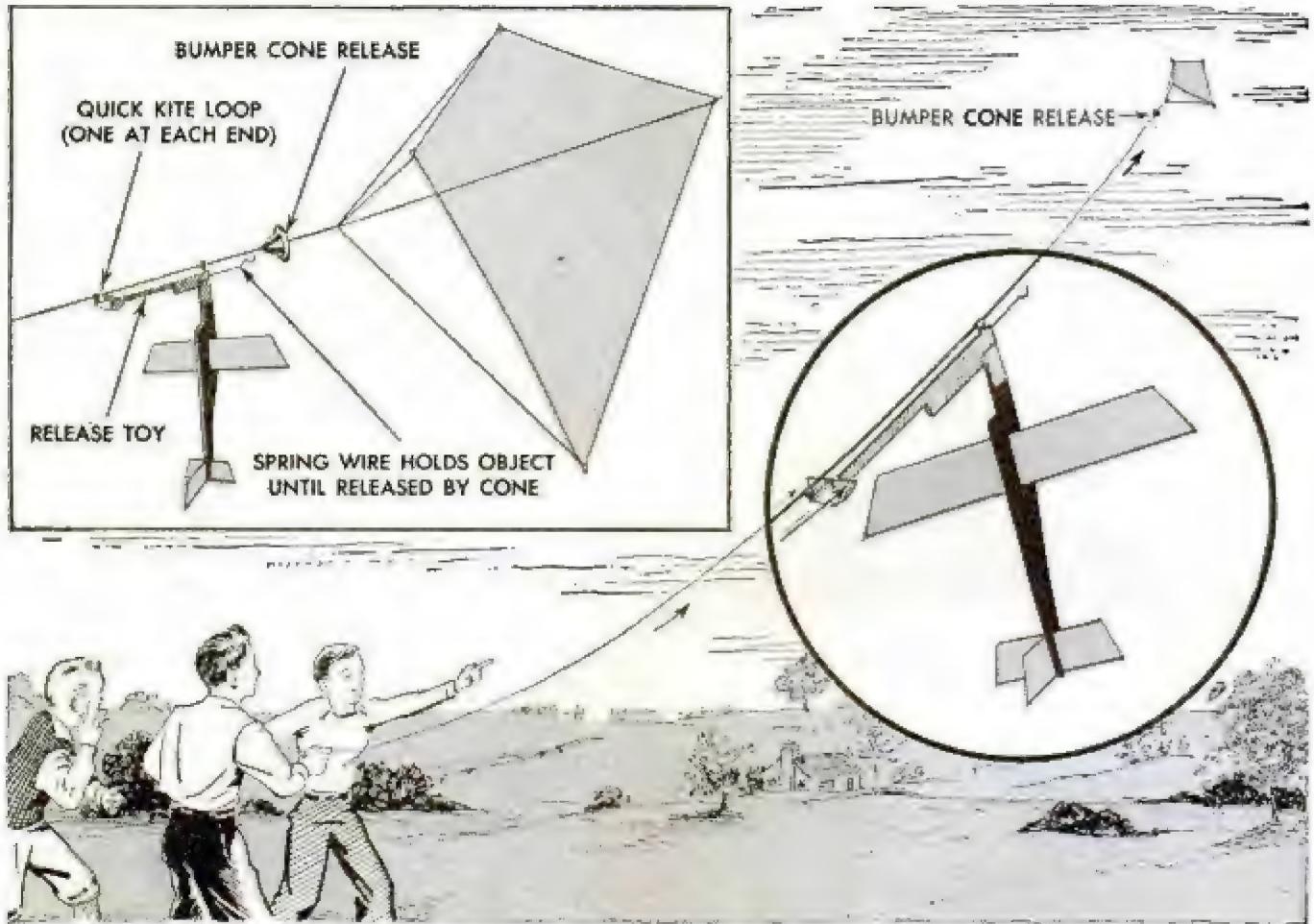
Coal will move northward in a continuous stream at about 6.8 miles an hour, arriving at the lake at a rate of 3400 tons an hour. The southbound ore belt will, of course, move at the same speed, but, because ore is heavier than coal, its delivery rate will be 5400 tons an hour.

Belt widths vary, with 72 inches on the south end of the main line, 60 inches farther north and 42 inches on the spurs. The electrically operated belts will be push-button controlled with electric-eye "watchmen" to stop the entire system if trouble develops.



Drawing illustrates the ingenious pulley system by which the conveyor belts are made to reverse themselves so that they will carry material either way





Kite-String "Carrier" Frees Planes at 3000 Feet

Model planes, small parachutes and other lightweight objects descend from as high as 3000 feet after release from a toy carrier that rides up an ordinary kite string. Wind blowing against a cone at the rear pushes the device up the string. Objects hitched

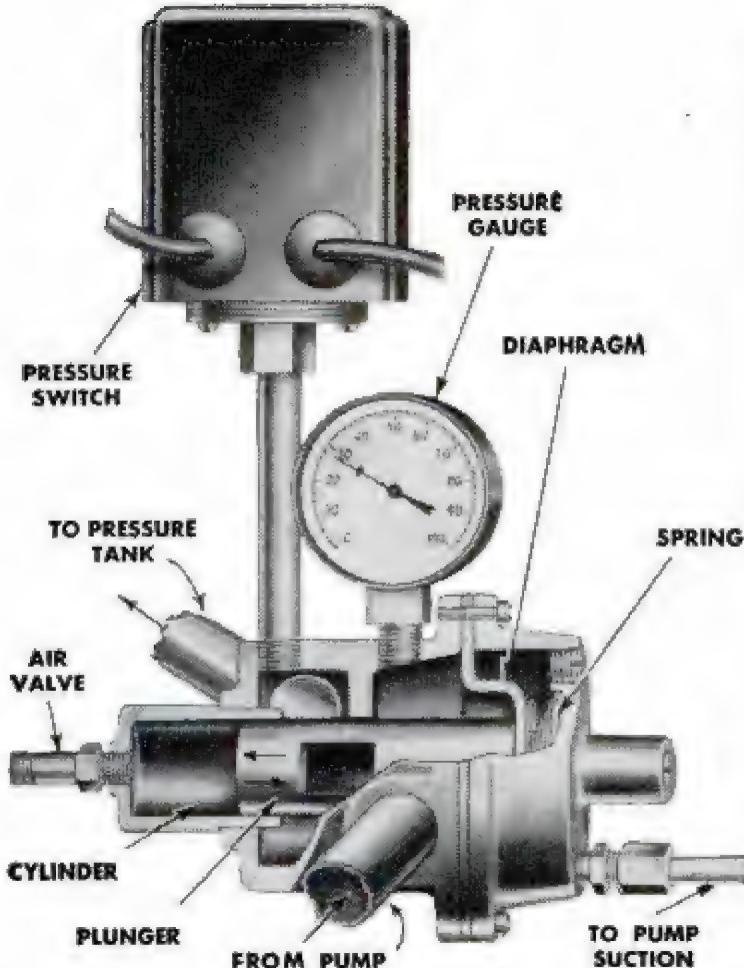
to a spring wire at the front are released when it hits a bumper cone tied below the kite. The carrier returns down the string by its own weight. It takes about four minutes to go up 1500 feet and a minute to slide back.



Mobile Betatron

Capable of being aimed in any direction, a 10-million-volt X-ray generator is powerful enough to send its rays through 16 inches of steel. The powerful generator, said to be the world's first mobile betatron, is installed at the Naval Ordnance Laboratory, White Oak, Md., and will be used to study the complex internal assemblies of mines, torpedoes and other Naval ordnance. Compactly housed in a steel casing, the betatron weighs about 5500 pounds and can be moved around with a crane. It is housed in a special building surrounded by concrete walls three feet thick to protect personnel.

Glass insulators on telegraph poles are being replaced by an unbreakable rubber type that is much smaller and weighs about one tenth as much.



Valve Meters Air Into Water Tank

Air is injected into the pressure tank of a water system by a metering valve to keep the system from being "waterlogged." Each time the pump starts, the valve injects air into the tank, maintaining an air cushion above the water. The automatic valve is installed between the pump and tank. When the pump starts, the pressure, acting on a diaphragm, moves a plunger out of a cylinder, sucking in air. When pumping stops, the piston is driven back by a spring, forcing the air into the valve from which it enters the tank when pumping is resumed.

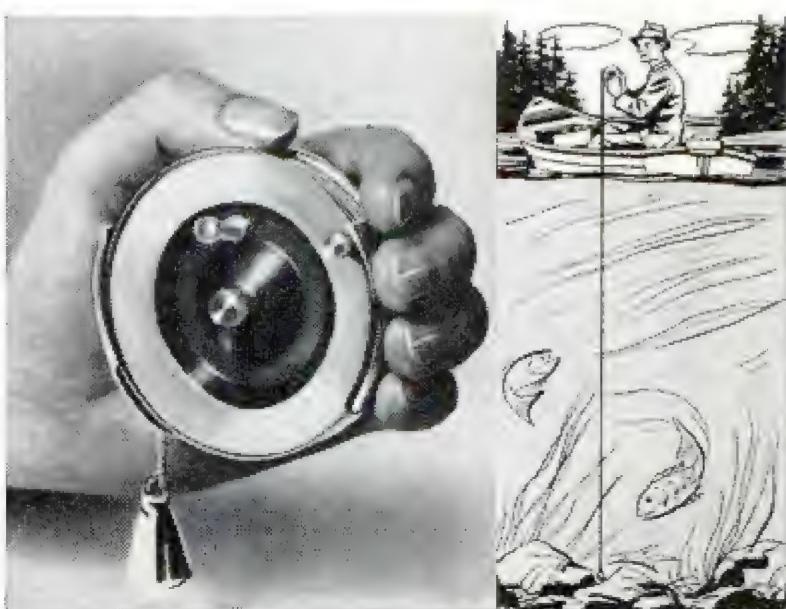
Reel Indicates Water Depth

Fishermen can tell the exact depth of the water with a pocket reel that measures up to 100 feet. To check the lake bottom, the angler releases a brake screw on the reel which allows a weighted line to drop through the water. When the weight hits the bottom, he reads the depth in coded markings on the water-resistant line. He then reels in the line and resets the brake screw. The reel permits the angler to chart his favorite fishing spot so it can be located at any time. The line is coded at one-foot intervals for easy reading.



Disk Holds 30 Minutes of Dictation

Seven-inch disks, recorded on a new dictation machine, are so light they can be mailed for three cents, yet hold 30 minutes of dictation. The seven-inch Vinylite records are slipped into the machine from the side and are positioned automatically. To prevent "dry runs," a warning light blinks if no disk is in the recorder or if the cover is not down. A locating pointer enables the operator to find his place quickly on the record, should he remove it before the full time is used. A companion machine for the secretary plays the recording.



Chrysler Family Debut



The new Plymouth is wider on the inside and narrower over-all—leaving room to spare getting into garage

By Wayne Whittaker

WHEN THE TOP BRASS of the Chrysler Corporation planned its strategy for 1949, they made a 90-million-dollar bet.

They wagered that handsome outlay for retooling on their belief that the American motorist is tired of having his hat knocked off every time he gets in or out of a car; that he would welcome a car with detachable fenders in preference to a fancy repair bill every time a panel-side automobile comes limping home with a bashed fender; that he'd like easy access to the wheels instead of having to unbutton skirts of metal to get at a flat tire.

So they embodied those features in the whole Chrysler family—Chrysler, DeSoto, Dodge and Plymouth—as they planned the

cars that would celebrate the silver anniversary this year of the first Chrysler automobile.

The stylists were sure that the public is more concerned with headroom than with a low, super-swanky silhouette parked at the curb; that people like larger doors which open all the way and stay open for easy entrance and exit, and a reduced overall exterior width. Despite the fact that every car in the line has wider seats than ever, the outside widths have been reduced from $1\frac{3}{4}$ to $3\frac{3}{4}$ inches. The height of all new models has been lowered by $1\frac{1}{8}$ to $2\frac{1}{4}$ inches.

One question is always asked about every new car on automobile row. Does it look like the other postwar cars? The an-



Top, 1949 Plymouth four-door sedan shows conservative styling. Below it is the Chrysler Windsor four-door

swer, as a glance at these pages will show, is: No, they look like conservative Chrysler-line cars rather than copies of their competitors. Perhaps there's a slight hint of Studebaker in the shape of top and rear deck, but the over-all design is distinctively Chrysler's own.

When K. T. Keller, president of Chrysler Corporation, was asked what he considered to be the outstanding feature of the new line, he said:

"We had to make up our minds what course to take in developing these new cars. It wasn't so much that we wanted everything on them to be new—although there are many improvements. The engines, for example, all have higher compression ratios. As far as design goes we wanted to build an outstanding car, a car that is easy to get into and get out of, that is easy to

garage, to handle in traffic or when parking. The outsides of our new cars are actually sculptured around conditions prescribed for the inside."

Despite the detachable fenders, exposed wheels and generous headroom, the '49 Chrysler line follows the straight-line styling trend and increased visibility introduced after the war. The corporation engineers and styling experts, of course, have had the advantage of studying the acceptance of many postwar innovations pioneered by others. At one time the embryo '49 Chrysler line was fenderless but this was changed after a careful sampling of public opinion.

Among the big news items in the Chrysler family debut are Plymouths and Dodges with reduced wheelbase in addition to the regular lines. The small Plymouth has a



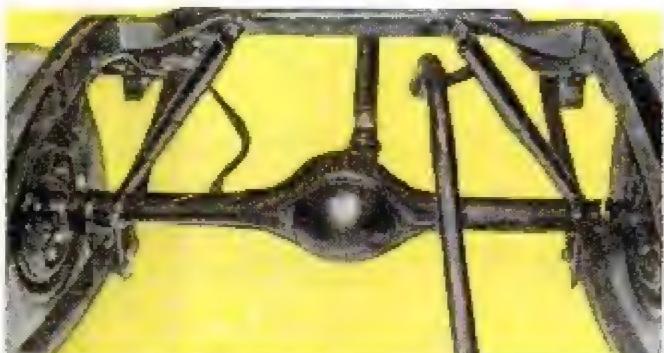
The Dodge Coronet four-door shows postwar styling but—look at those detachable fenders, front and rear

111-inch wheelbase compared with 118½ inches on the regular model; the small Dodge has a wheelbase of only 115 inches, compared with the regular's 123½ inches. The small Plymouths include a car new to the line—the Suburban, an all-steel station wagon which will be priced below the regular station wagon.

The small Dodge line will be known as the Wayfarer. It includes a real sensation and innovation which already has the brass hats of the motor industry shaking their heads. This is a "stripped" convertible or three-passenger one-seat roadster, a sleek automobile which probably will create a furor among the youth of the nation. It has no side windows like ordinary convertibles, but uses plastic side curtains (Paging Grandpa!) which are stored in a compartment back of the seat. The car has no horn or backup light, no clock, no interior frills of any kind. The canvas top is manually operated. The rear luggage compartment appears large enough to hold two or three trunks. The industry is not so much concerned about the smart appearance of the car as it is about rumors concerning the low price for which the roadster will sell. The car will be unveiled officially sometime next month.

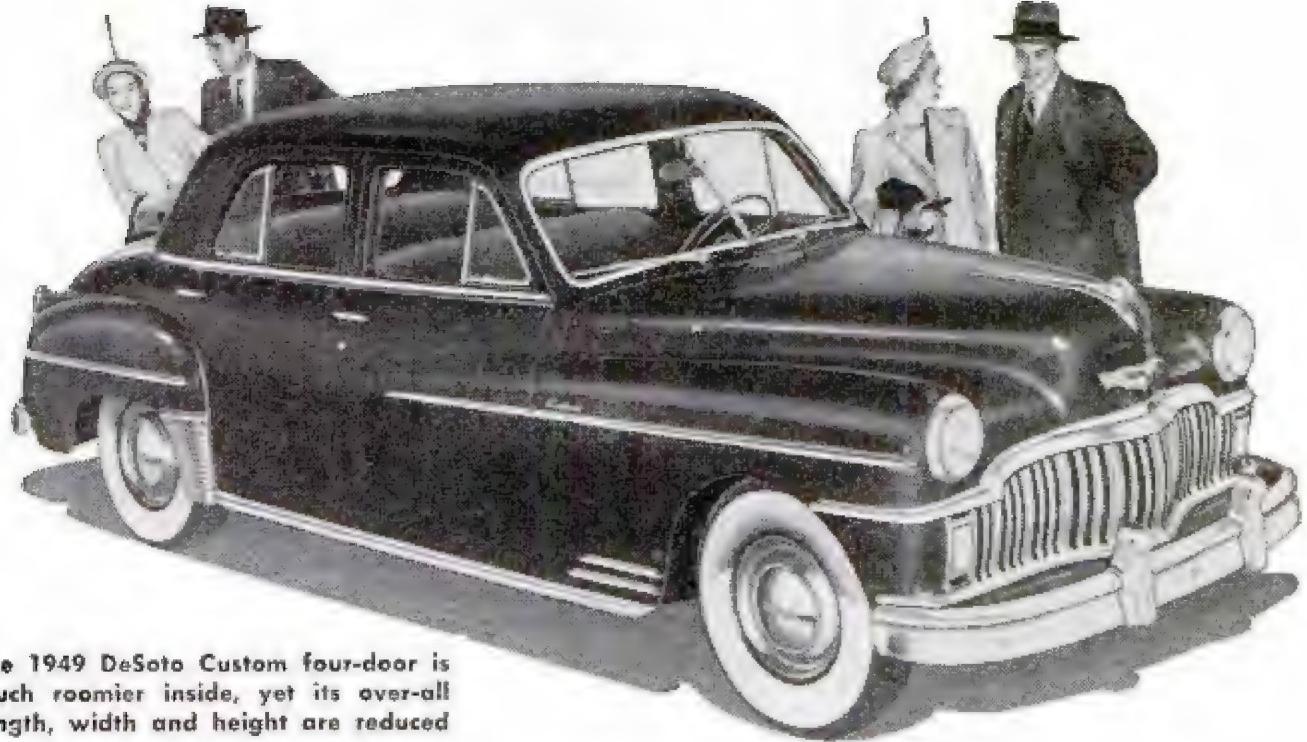
The new Plymouth (bread-and-butter car of the Chrysler family which sold at the rate of 375,373 cars last year compared with 232,863 for Dodge, 118,951 for Chrysler and 90,223 for DeSoto) has been completely redesigned and streamlined. You have to look closely to make sure that those fenders really are detachable.

The Plymouth engine has been boosted in horsepower from 95 to 97. Performance



Airplane-type rear shock absorbers are mounted on all Chrysler line '49 cars in diagonal fashion to help eliminate sidesway. They are shown here on the Dodge. Below, no fender panels cover rear wheels





The 1949 DeSoto Custom four-door is much roomier inside, yet its over-all length, width and height are reduced

has been improved with a new cylinder head which increases compression ratio from 6.6 to 1 to 7 to 1. A new chrome-plated compression piston ring reduces cylinder wear and provides greater protection during the breaking-in period. Quicker warm-up and faster throttle response are two of the advantages of a new intake manifold.

When you step into the '49 Plymouth you are first impressed with the amount of head and leg room, both back and front seats, and the excellent visibility. The windshield

This picture proves that Plymouth fenders, like the other cars of the Chrysler line, are really detachable

is 37 percent bigger than in previous models and the rear window is 35.4 percent larger. The seats are much wider—an increase to 56 inches in the front and to 57 inches in the rear. This is something of a design feat when you consider that the over-all width of the cars has been decreased by more than an inch.

The regular Plymouth line has a 118-inch wheelbase (an increase of one inch over the '48) with six models: a club coupe and a four-door sedan in the Deluxe series and

A rack and spring hold the bumper jack in place beside the spare tire and prevent it from rattling



a Special Deluxe club coupe, four-door sedan, convertible coupe and station wagon. The three models with the new 111-inch wheelbase are the two-door sedan, a three-passenger coupe and the Suburban.

The Plymouths have "smooth riding" diagonally mounted shock absorbers which allow greater road clearance and reduce sidesway. A new automatic electric choke, of the same type used on other Chrysler-line cars, has been added. Among the innovations of primary interest to the driver is the combination ignition and starter switch which eliminates the starter button. The car starts by turning the ignition key slightly beyond the "ignition on" position. When released, the key automatically returns to "ignition on." Aside from the convenience to the driver, this starter makes it impossible for children to move a car which has been left in gear by pushing the starter button.

Other new items include a vent-window lock designed to reduce theft of articles from parked cars, a heavily armored ignition cable to reduce theft, bull's-eye lens in the center of the sealed-beam headlights to increase light output, hard-to-break plastic lenses in the stop, tail and parking lights, an enclosed circuit breaker which eliminates the need for replacing lighting-system fuses, and a rattleproof rack for the bumper jack.

The corporation's No. 2 seller, the Dodge, is being built in three lines of passenger cars with 11 body styles, two wheelbases and an improved 7-to-1 compression engine. The new cars are shorter in over-all length, narrower in exterior width and lower in height. However, the Coronet and

Meadowbrook models (regular line) have a wheelbase of 123½ inches, an increase of four inches. This increase results in better cradling of the passengers between the axles and a smoother ride. All of the cars have much less overhang in both front and rear which makes parking easier and provides better road clearance on driveways with steep grades. Over-all length of the regular line is 203½ inches.

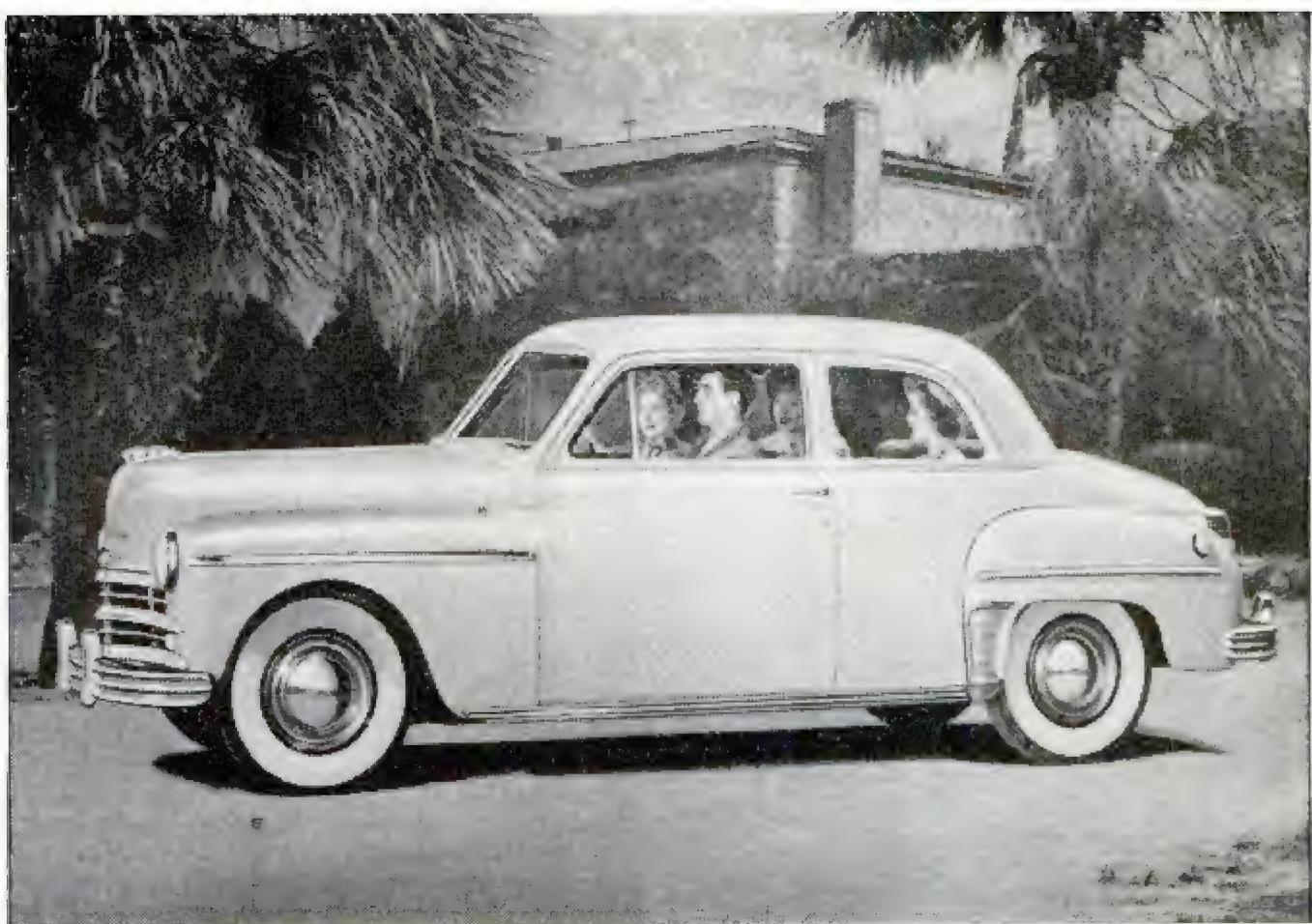
The higher compression Dodge engine has a new cylinder head. Other engineering advances include improved carburetor, intake manifold, camshaft and fuel pump. The intake manifold gives a better distribution of the fuel-air mixture to the cylinders and its shorter riser produces more rapid response to acceleration. The new camshaft with quick-lift, short-duration valve timing affords improved performance through a large part of the speed range. Filter, gasket and sediment bowl have been eliminated on the fuel pump and an air dome provided on the suction side. Another engine improvement is a protective coating on cylinder walls which prevents scuffing or scoring during the break-in period.

A new Gyro-Matic transmission, available as extra equipment on the Coronet, frees the driver from shifting gears. The driver starts the car with the gearshift in "high" position and presses down on the accelerator. When sufficient forward speed is attained, the accelerator is released and the Gyro-Matic shifts automatically into "high." For extra power in passing, the accelerator is pushed to the floor to shift automatically into a lower gear.

The Dodge interiors are comfortable and quietly luxurious. The front seats are six

The roomy 1949 Plymouth station wagon has varnished wood trim and it can carry nine passengers with ease





inches wider and the rear seats nearly eight inches wider than the '48s. The instrument panel has been moved four inches forward to increase interior length for more leg room; headroom has been increased to 37 inches for both front and back seats. The Dodge "knee level" seats have a height of 15½ inches in front and 15½ inches for the rear seat. The windshield area has been increased 24 percent and the larger rear window minimizes any blind spots. The doors open almost all the way and stay open when you are getting in or out.

The instrument panels have been completely restyled with the gauges centered in front of the driver and recessed to avoid confusing light reflections. Rotary switches replace the push-pull type formerly used. Many of the innovations already mentioned on the Plymouth, such as the new ignition switch, tamperproof vent-window lock, bull's-eye lens in the headlights and plastic lenses in the tail and stop lights, are to be found on the Dodge.

The Coronet and Meadowbrook lines include three four-door sedan models, a club coupe, convertible, eight-passenger sedan and a station wagon. The small-wheelbase Wayfarer line will include a two-door sedan and a three-passenger coupe in addition to the roadster.

The six 1949 Chrysler lines, to be known as Silver Anniversary models, are the six-cylinder Royal and Windsor series with

(Continued to page 270)

Plymouth Special Deluxe club coupe shows shortening of over-all length by less overhang in front and rear

Headroom in the new Plymouth back seat? Plenty of it for a lady with a tall hat, and room to spare

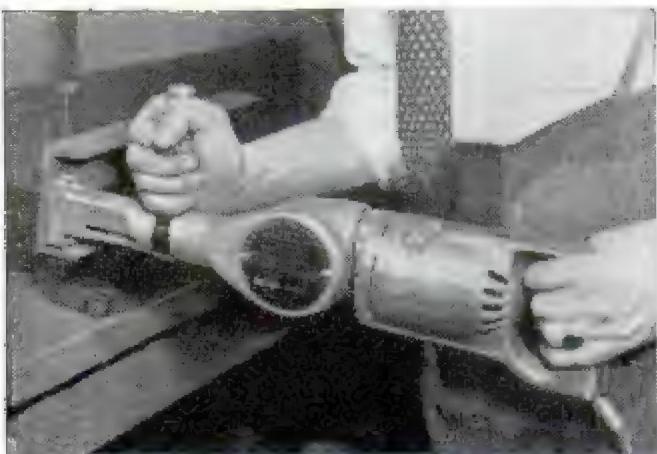
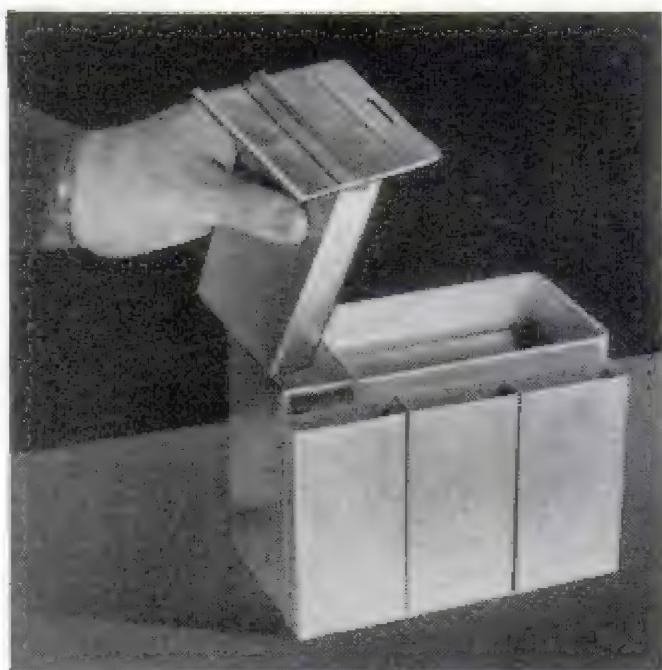




Two-Minute Camera

Photographs taken with a direct-positive camera are processed right on the spot, in bright sunlight or shade, and completed within two minutes after the exposure. The camera, designed for sidewalk photographers and others who want prints to be ready almost immediately, is loaded with a magazine containing enough paper-film to make 50 exposures at a cost of less than two cents each. After the exposure is made, the photographer turns a crank, moving the paper down into a lightproof box fastened to the underside of the camera. A built-in knife cuts the photo from the roll. The box, with the paper-film inside, is removed from the camera and dipped in a developer. Baffles in the bottom of the box allow the solution to enter, but prevent entry of light. The print is then removed from the box and rinsed, bleached and redeveloped in daylight. The photos are permanent and dry in a few seconds.

Right, box of paper-film is loaded in camera. Left, after exposure, photo drops into this lightproof box which is removed for developing, below. Processing solutions enter box through baffle system in bottom

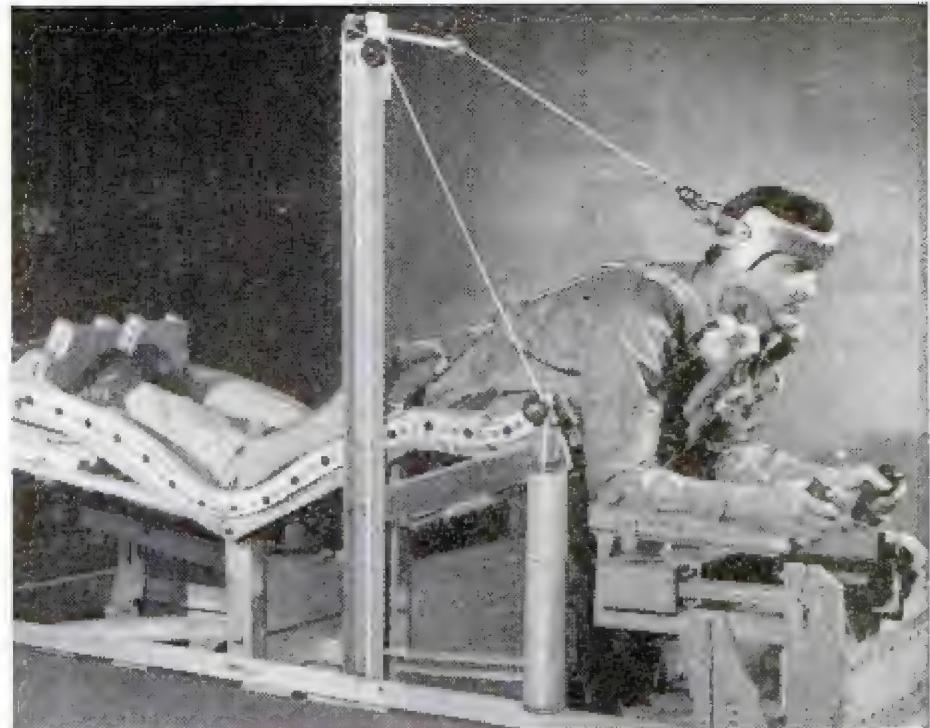


"Gun" Saw Cuts Rubber or Steel

Anything from rubber to stainless steel can be cut through by a new electric gun-type saw. Its blade speed is variable and stroke length adjustable up to two inches, depending on material being cut and its thickness. A supporting handle that swivels 360 degrees and locks in any position eases arm fatigue. Guides for blade widths from a half inch to one inch also serve as gun sights in following a line. The saw can be driven by an electric drill, an air drill or a flexible shaft.

"Bed" for Pilot Lessens Fatigue

Flying fatigue and the threat of "blackout" are reduced to new lows by a prone-position pilot bed being tested at the U. S. Air Force Aeromedical Laboratory. Basically a nylon netting supported over curved sides to make it fit body contours, the bed has enabled pilots to withstand up to 12 Gs (force of gravitational pull). Seated conventionally, a pilot can tolerate only about five Gs. Experimenters have used the pilot bed for eight hours continuously without experiencing discomfort. The prone position also requires less space for the cockpit and permits development of planes with slimmer silhouettes. Supports for the abdomen and head are adjustable. The arms rest in movable pans padded with foam rubber as the pilot operates special handgrip controls. A leg board gives each limb its own support, preventing pressure on the inside of the knees. The test bed is in the nose of a B-17 and another is to be put in the forward part of an F-80 jet plane. Both aircraft permit conventionally seated pilots to take over controls in emergencies.



Air Materiel Command photos



Twin-Torpedo Racer

Capable of speeds well over 100 miles an hour, an Italian racing car looks more like a pair of wheeled torpedoes than a motor vehicle. The driver sits in one torpedo while the power plant, a 500-cubic-centimeter motorcycle engine, is in the other. The car covered one mile at an average of 79.9 miles an hour from a standstill; 126.4 miles an hour with a flying start.

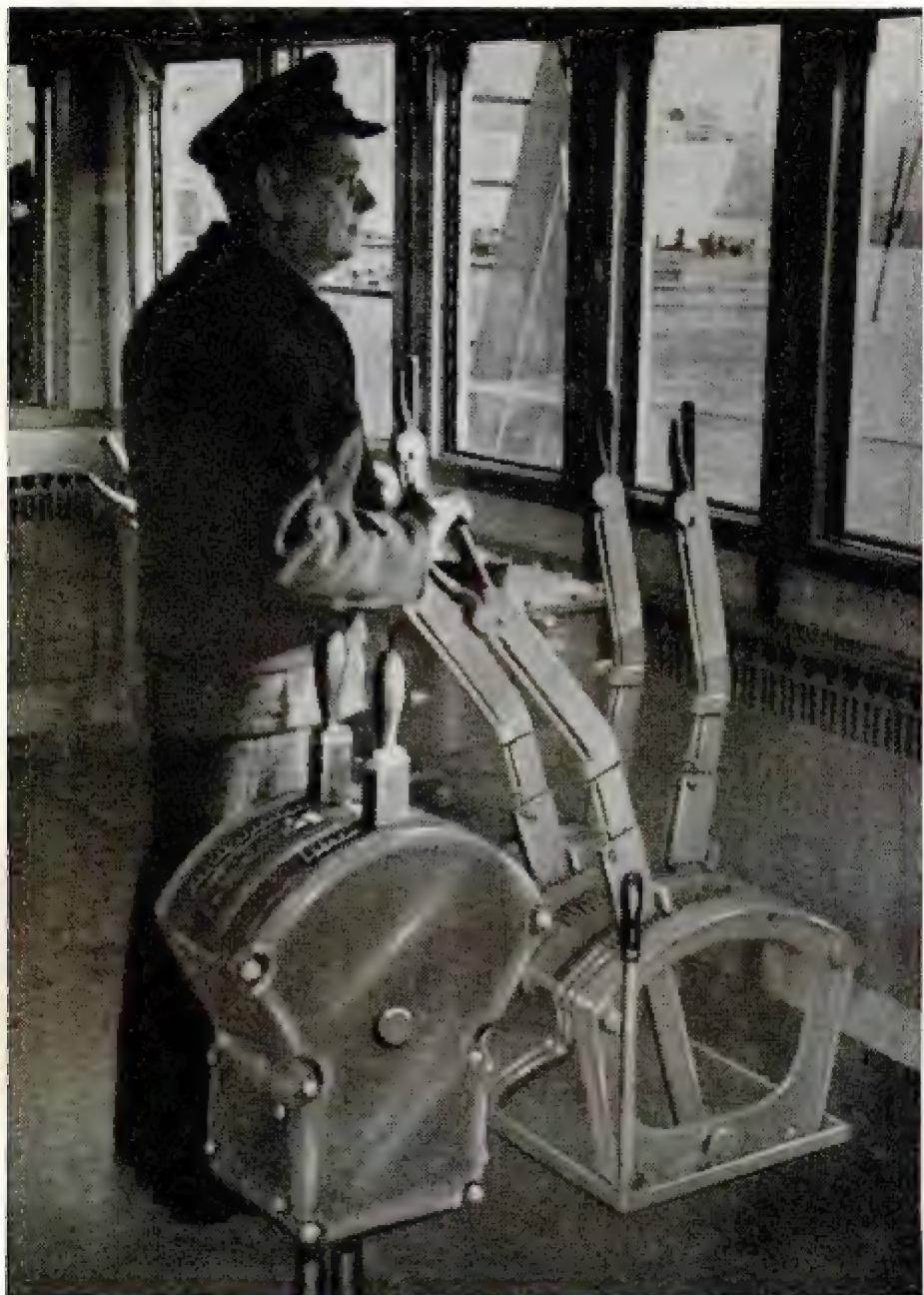
HARBOR SWEEP.....

EARLY this year a strange vessel with twin hulls began house-cleaning operations in New York harbor. Her job is to collect and remove driftwood and floating debris which would soon stop traffic if not cleared away.

The new Driftmaster, 100 feet long and 36 feet wide and powered by two diesel engines, is the first vessel ever built specifically for this purpose. She was designed by U. S. Army Engineers, who have the job of keeping waterways clear for commerce.

Spaced 20 feet apart, each of the pontoonlike hulls is but eight feet wide, allowing water to flow freely in a channel through the center of the vessel. Engine room, crew quarters and control bridge are mounted on a superstructure joining

From control bridge straddling twin hulls of U. S. Army's Driftmaster, Capt. William P. Hocking operates levers that raise and lower drift nets



the hulls some feet above the water line.

Two nets of steel chain links hang in the well between the hulls. They are dipped alternately into the water flowing between the hulls to scoop up drift when the vessel is under way. Each net is 20 feet square.

When floating debris is sighted, the front edge of one of the nets is lowered about three feet below the surface of the water. A steel bar at the front edge of the net travels in tracks along the sides of the wells. The vessel drives forward and drift flows between the hulls and into the net.

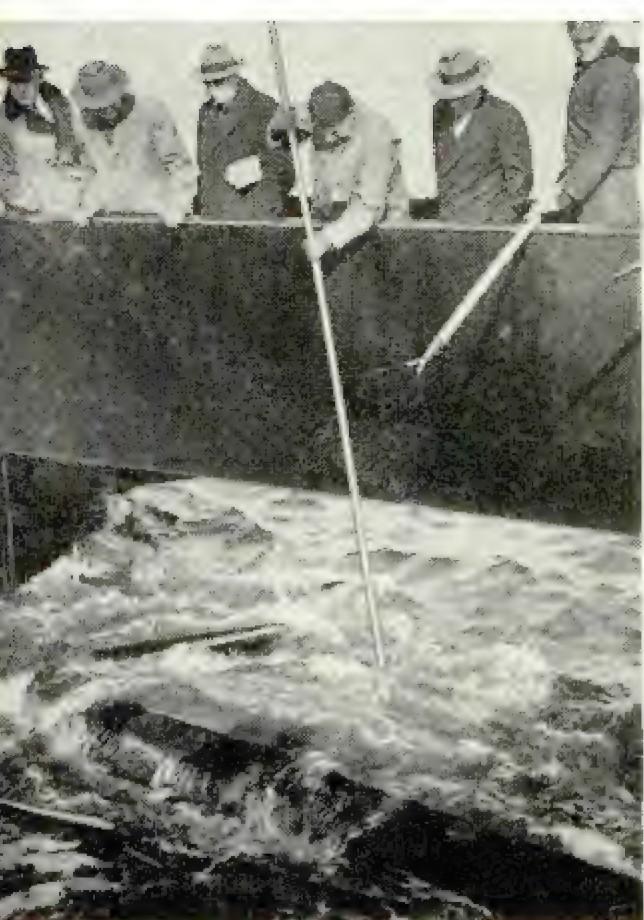
The back end of the net is kept about six feet above the water. To prevent log jams, crew members armed with long pikes work from small steel bridges or walkways joining the hulls. By pushing timbers into parallel piles as they float to rest against the back of the net, about five cords of wood can be picked up in each net.

When one net is full, it is hauled up clear of the water to keep from being a drag and slowing the boat down, and the second net is lowered into working position.

When both nets are full, the Driftmaster, running at about eight miles an hour, carries her load to two incinerator barges anchored in the Upper Bay near Robbins Reef. Using the boom located about midships, the nets are picked up one at a time and the contents dumped on the barges. One of the barges is concrete, the other steel.

Although all of this drift material is pretty thoroughly waterlogged, much of it is also coated with oil, and in time it all burns up.

Drift starts accumulating up around the Great Lakes and Lake Champlain, and in all the little streams which flow into the Hudson. It consists of rotting piers, doors, ladders, packing cases, wire-rope reels, chicken coops, pieces of pianos, fences,



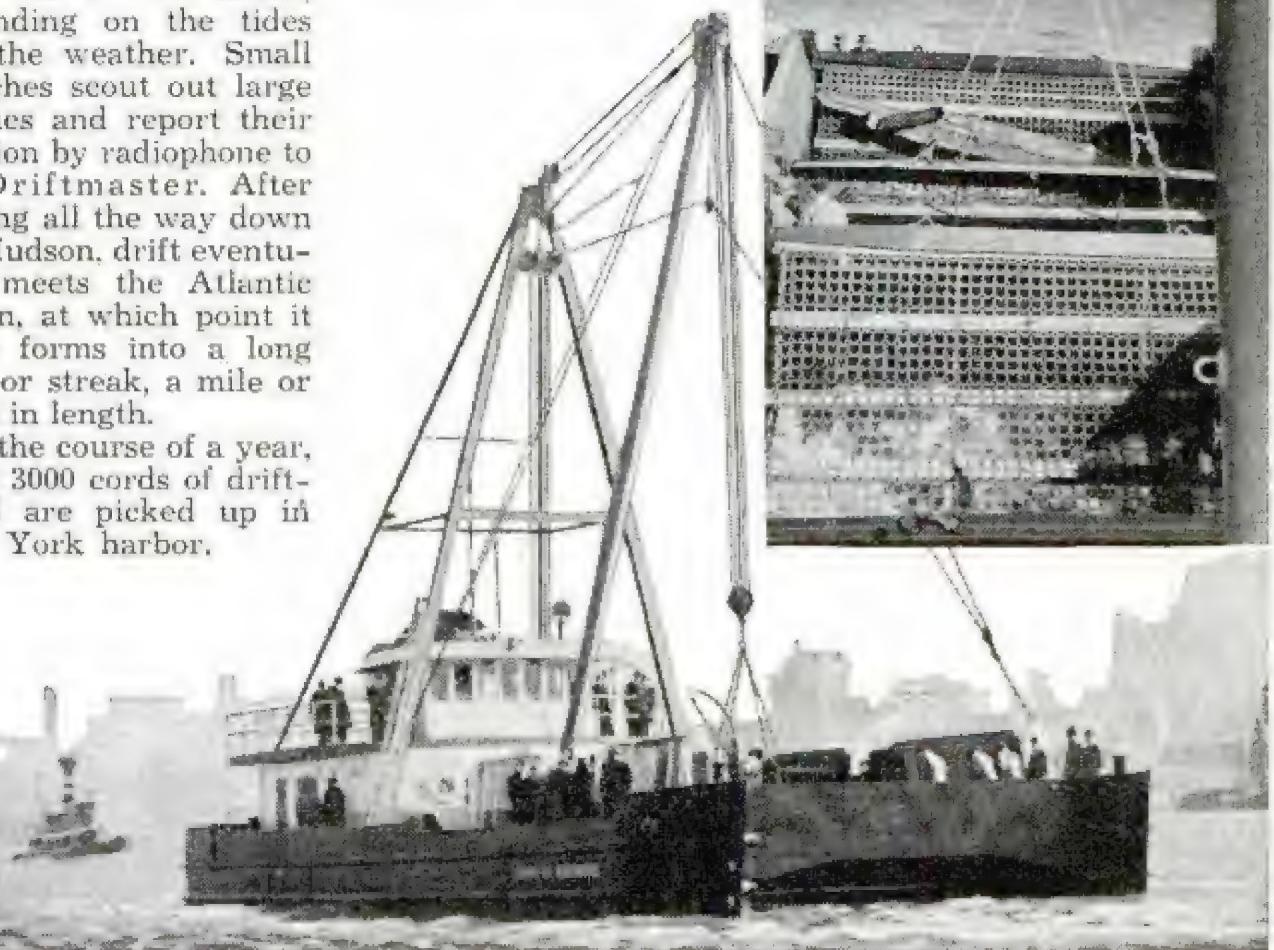
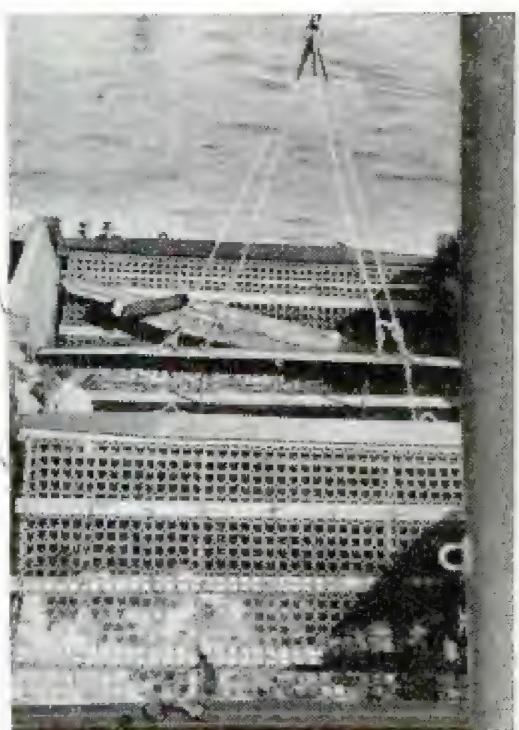
Reporters on trial run watch crewmen, upper left, guiding driftwood between hulls. Right, front view of vessel

railroad ties, telegraph poles—the list could go on forever.

Drift shifts from one side of the harbor to the other in a few hours, depending on the tides and the weather. Small launches scout out large patches and report their location by radiophone to the Driftmaster. After coming all the way down the Hudson, drift eventually meets the Atlantic Ocean, at which point it often forms into a long line, or streak, a mile or more in length.

In the course of a year, some 3000 cords of driftwood are picked up in New York harbor.

Steel-chain drift nets, right, seen looking forward from the bridge. Below, boom raises and positions nets singly, dumping them on an incinerator barge





U.S. Navy photo

Mauler Flies Record Weight

Grossing over 25,000 pounds, a Martin Mauler dive-torpedo bomber became the heaviest single-engine plane ever flown. Both its gross weight and 9000-pound pay-

load were much greater than that of a 21-passenger airliner. The record flight was made with complete armament—12 five-inch rockets, three 2200-pound torpedoes and four 20-mm. cannon. A one-man plane, it is being used experimentally on carriers.



Left, bolts and spacers in place ready for extra wheel. Right, maximum traction is provided with duals on all wheels and tires at low pressure

Jeep Adaptor Kit Adds Extra Wheels

Front and rear wheels of a jeep can be made dual for added traction with an adaptor kit consisting of extension bolts and spacers. It takes only a few minutes to mount the extra wheel. You replace the wheel nuts with extension bolts, insert spacers between bolts and slide the extra wheel in place. Chains can be used on one or both wheels.

Auto-Dashboard Fence Holds Cigarettes Upright

Held in place by two rubber suction cups, a metal fence keeps your pipe, cigarettes and other small items on top of the dashboard where you can easily reach them. A holder inside the fence is shaped to hold a package of cigarettes in an upright position. The fence is made of highly polished chrome steel.

White portland cement concrete floors are used in aircraft plants to reflect light on the under parts of equipment on which mechanics are working.



Perch on Auto Door Keeps Pet Off Laps

Dogs have a car seat all their own in a pet perch designed to keep Rover off the passengers' laps. The seat, made of pressed wood, is a semicircle 20 inches in diameter. It has a protective railing for the pet and is padded along one side to protect the car's finish. The perch hooks into the window slot, giving the pet a commanding view of the scenery and plenty of fresh air to prevent him from becoming car sick.

Remote Control for Tractor

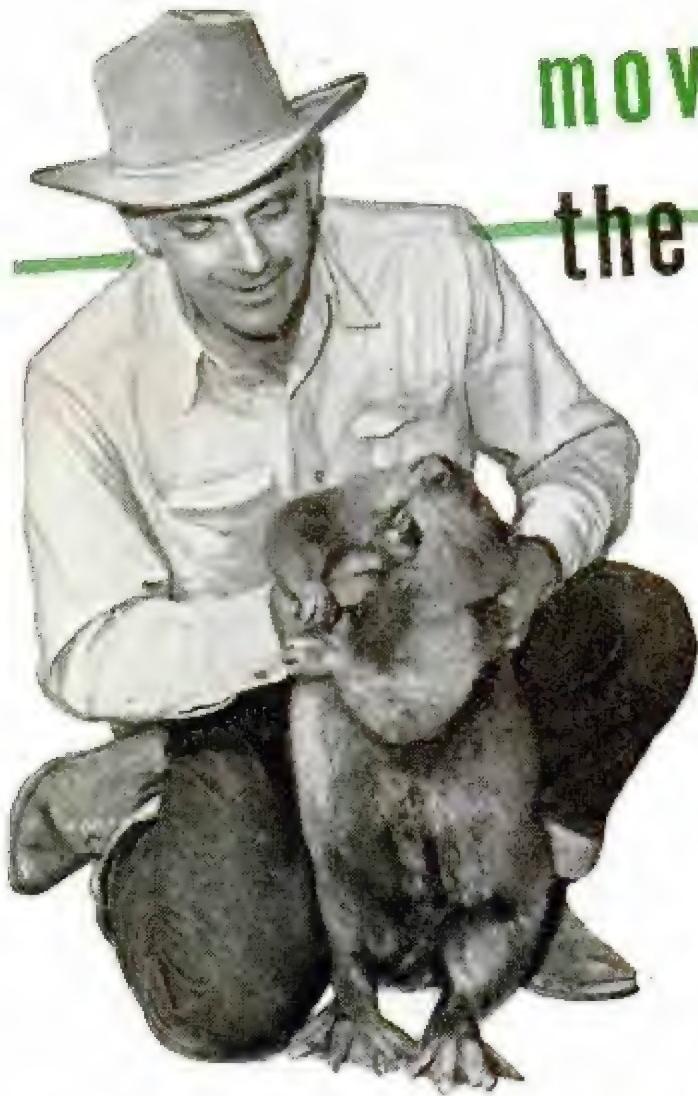
Operating a pull-type, 16-foot hillside combine is normally a two-man job, one man to run the combine and the other to drive the tractor. Richard Johnson of Condon, Ore., does both jobs with the aid of a remote-control apparatus that enables him to drive the tractor right from the combine platform. Compressed air from a small compressor driven by the fan belt does the physical work of shifting and steering as electric air valves are opened and closed by switches on the combine control panel. An electric cord connects the control panel with the tractor. The labor-saving remote-control system has been used for drilling, weeding, spring toothing and road grading as well as combining.

Right, Johnson shifts and steers his tractor right from the combine platform with the switches on the control panel. Below, there's no driver sitting on the seat of this tractor as it pulls the combine. Below, right, close-up of the remote-control system



moving day for the PARABEAVERS

By Thomas E. Stimson, Jr.



Here's the distinguished fellow who builds dams and fur coats. Note the handlike forefeet, the webbed hind feet and the two long teeth that can fell a tree

THIS BEAVER is a smart one," John Rynearson decided. "I'll tear down part of his dam and put the trap near the break. That way, he'll get caught when he swims over to repair the damage."

John was inspecting a new beaver pond on a small mountain stream near the old ghost town of Idaho City, 40 miles from Boise. The pond was beginning to flood a dirt road alongside the watercourse. At this location the beaver was a nuisance and had to be removed.

Rynearson kicked a hole through the top of the dam with his boot and water began pouring through the break. Into the pool behind the dam he lowered a live trap, a wire-mesh contrivance that opens out flat. When tripped, it springs together like a suitcase, imprisoning the animal inside.

The trapper placed a couple of branches on each side of the trap to form barricades. These would force the beaver to detour across the top of the trap when he came over to repair the leak.

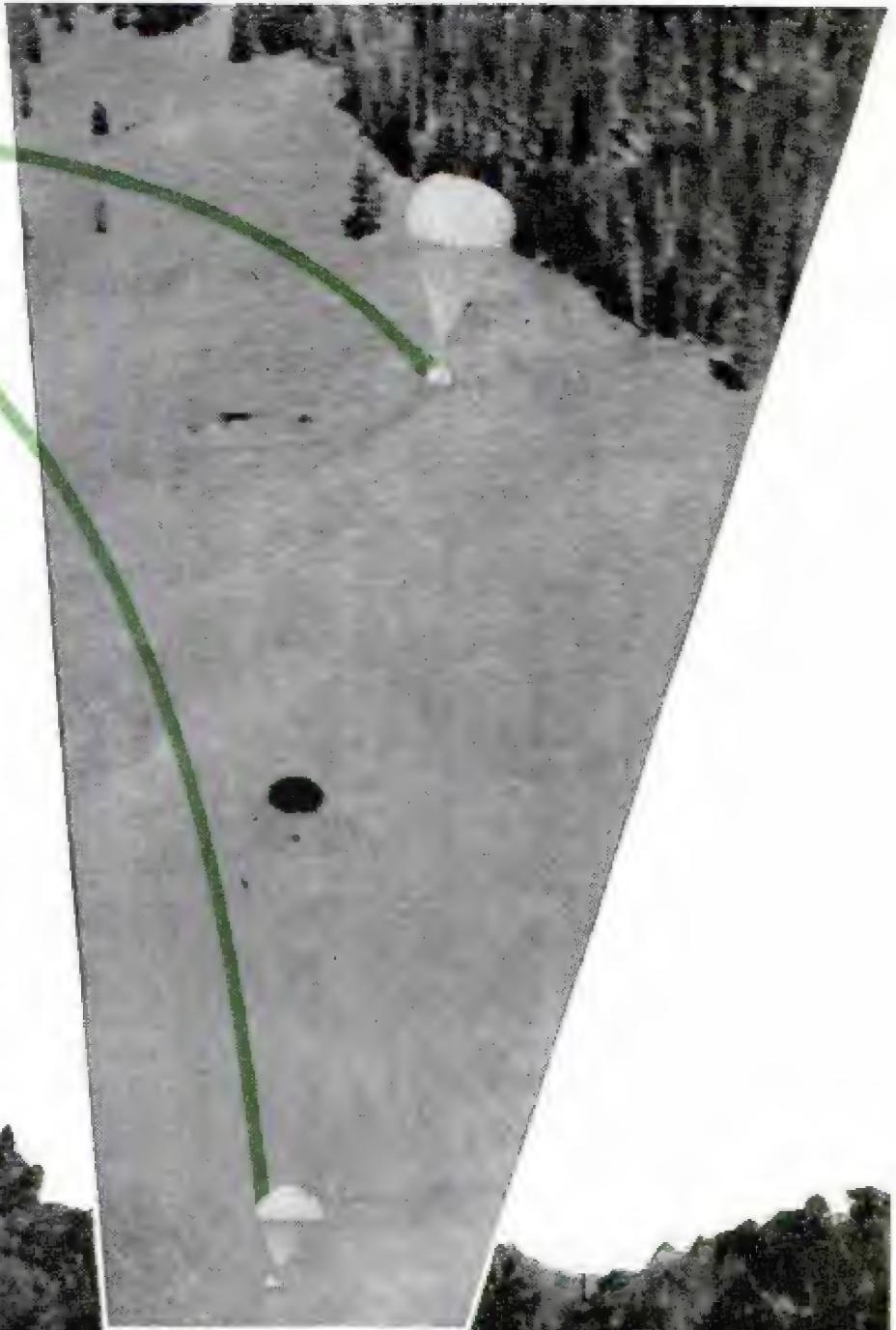
Popped into this crate, the beaver will be released by parachute. Rubber strips automatically open box

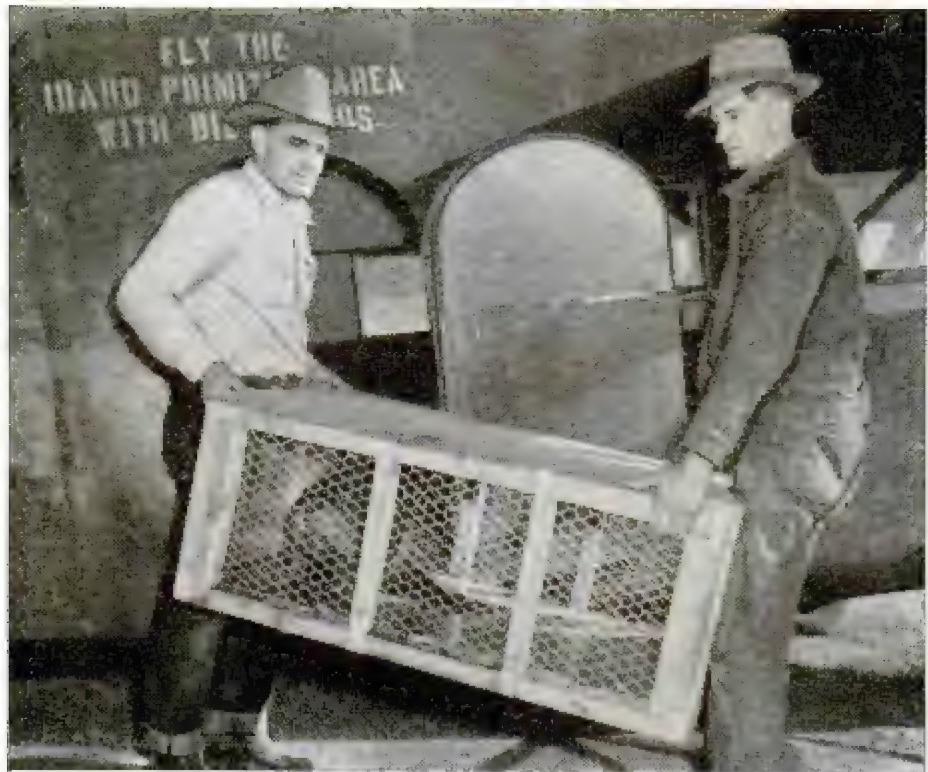


Rynearson would visit the trap again at dawn and, if he found the beaver inside, he would carry it by truck to an airstrip down near Boise where a plane would be waiting for a load of animal passengers. Before lunch time the beaver would have an airplane ride. He'd be tossed out of the plane by parachute, would walk away from the self-opening container when the parachute touched ground and would be making himself at home on a stream several hundred miles away from where he had been caught, in an area where he couldn't cause trouble.

Meanwhile Rynearson investigated another complaint. A farmer in the lowlands reported that the animals were continually damming his main

Right, crated animals drift down toward an unpopulated stream. Below, that black spot on the parachute is the beaver, already bound for the nearest water hole



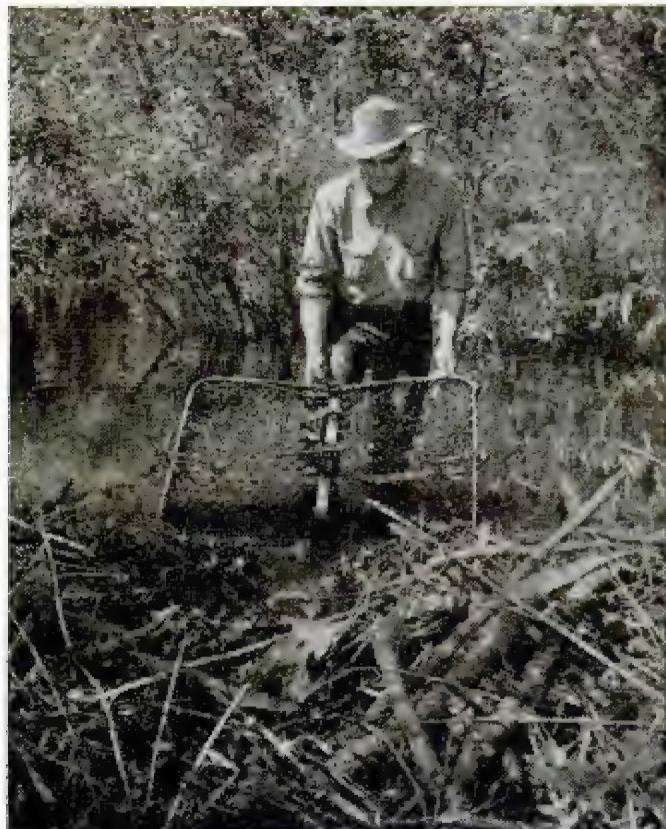


Aboard a transport plane goes a crated beaver for a trip to the mountains. This one will be hauled a few miles by truck after the airplane ride.

irrigation ditch and cutting off his water. The farmer would tear down the dam in the morning and the beavers would build it up again overnight. The beavers and the farmer had been battling for a week.

Beavers can be great nuisances when they settle in an agricultural area. Part of a caretaker-trapper's job in Idaho is to remove them from locations in which they are doing damage. Rynearson is a pro-

After kicking a hole in the dam, Rynearson sets a live trap. In investigating the break the beaver will trip the trap. Right, folded trap holds the animal while Rynearson fastens metal record tabs to his ears



fessional trapper and also is one of the men designated as caretakers of the state's beaver population.

Once there were almost 60 million beavers in the country; then they were trapped almost to extinction. They have brown glossy fur and are one of the most valuable of fur-bearing animals. It was the quest for beaver that first led explorers into many parts of the West, and some of the big fortunes of the times were founded on the beaver fur trade.

Forty or fifty years ago no more than a few thousand of the animals remained, tucked away in scattered mountain retreats. Stringent laws were passed to protect

them and gradually the beaver population has been built up. Today, they are flourishing all the way from Maine to Washington and down through the Rockies, other large mountain ranges and along numerous river systems. The recent history of the beaver is an outstanding example of how conservation can be made to work.

Beavers are actually rodents, the largest of the several hundred rodents of North



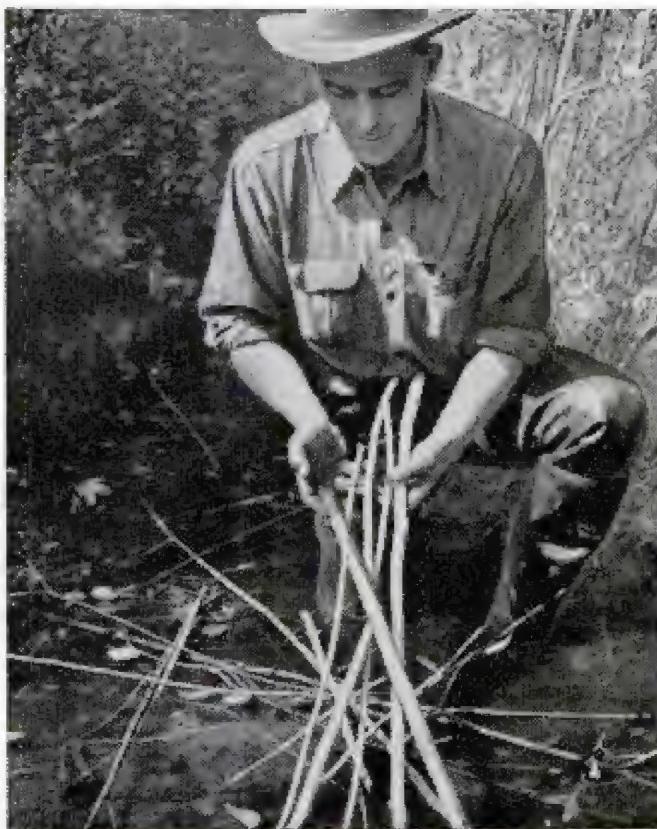
America. They average 25 to 30 pounds and large specimens may weigh as much as 50 or 60 pounds. They are amphibious and will die if kept away from the water. The animals have forefeet that resemble tiny hands and hind feet that are webbed. Their broad flat tails are used as props when sitting up, as rudders when swimming and for slapping the surface of the water to produce a danger signal. Their principal food is the bark of willow, aspen and similar trees. The animals cut wood with two long teeth that are constantly growing.

The first thing beavers do when they migrate to a new location or are planted on a stream is to build a dam. They want a personal pool of quiet water in which they can play and on which they can build a house that will protect them from predators and from winter's cold. In the muddy bottom of the pool they anchor hundreds of fresh branches as a food supply for winter. After they eat the bark they will use the sticks to build up or repair their dam.

The dam itself is a well-engineered and solidly built barrier that withstands winter ice and spring freshets. Often it contains a big tree that the animals fell in place, or it may include several logs they cut to size and float or push to the location. Twigs, sticks, branches and even stones are

In taking a beaver census a trapper jumps up and down on a large house. The animals are frightened out and the trapper counts them as they swim away

Food sticks from which the bark has been eaten indicate that beavers are living along this stream





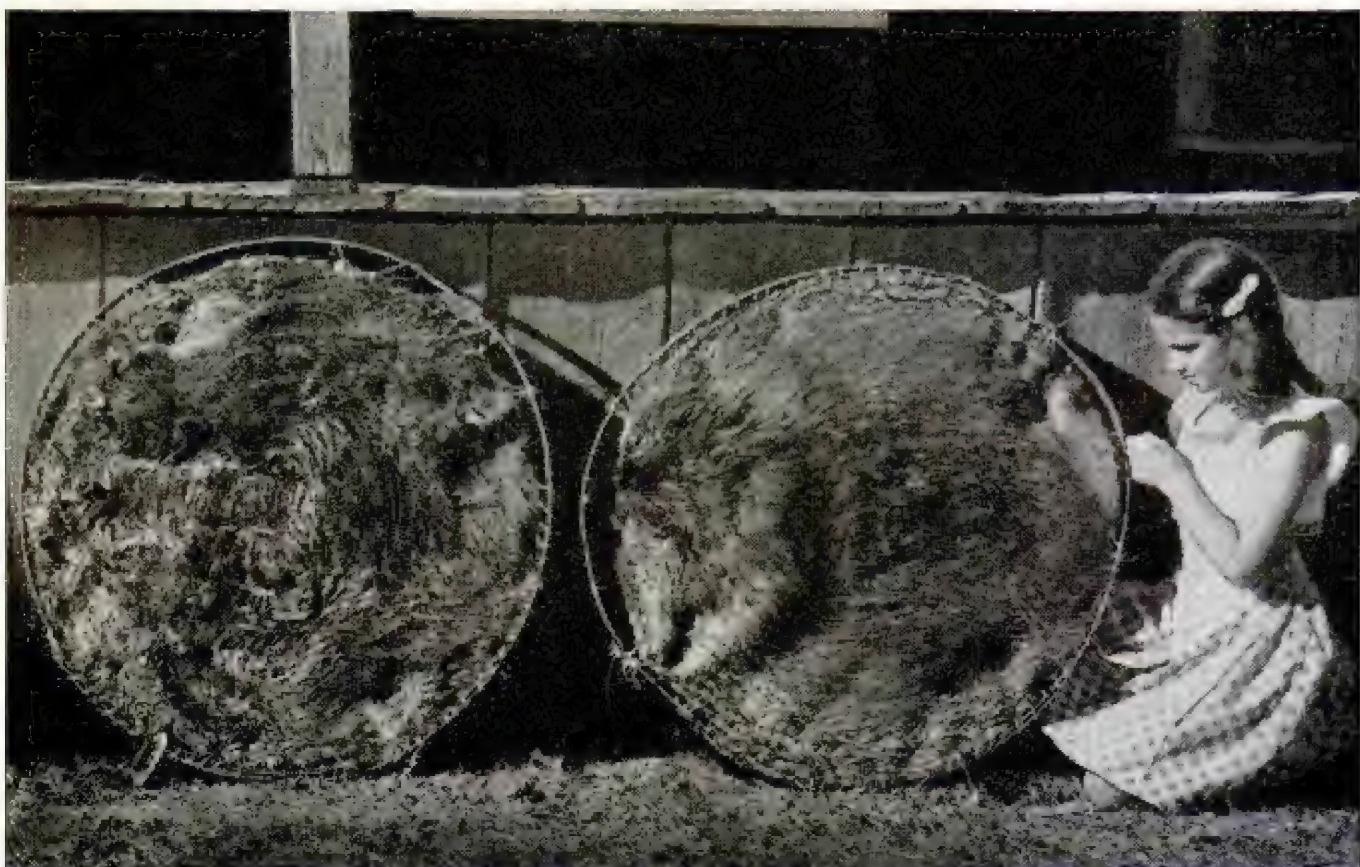
Caretaker-trapper estimates the size of new beaver on a mountain stream by measuring the size of the chips the animal cuts from a tree. Below, girl stretches skins on metal hoops. Traders prefer round-shaped pelts

packed into the interstices. Sometimes mud is carried up from the bottom to help fill the cracks. On a large stream a family of beavers has been known to build a dam that is a quarter of a mile long and up to four or five feet in height.

Their house is attached to the dam or a bank or sometimes is built as an island, composed of twigs, stones and mud. The foundation is built up to water level so that the animals have a dry floor under a domed roof. A large interior may measure 10 feet across. Usually, there are two underwater entrances. Their house makes a permanent abode for generations and is repaired every fall with more sticks and mud to insulate it against the weather.

Beaver dams are natural conservation devices. The dams hold back water and silt, stabilize stream flow and stimulate the growth of trees and bushes. Generally speaking, all kinds of wildlife

(Continued to page 266)



Scooter-Car Seats Two

Fuel bills are low in a midget car which travels 60 to 75 miles on a gallon of gas and uses only a couple of ounces of oil a week. The open-air car has a five-horsepower motor that is started with a rope. Seating two, it scoots along at 40 miles an hour. Two other models will be available soon. One will have an enclosed body, battery, generator and starter and will be powered by a 7½-horsepower motor. The other will have a half body from the driver's seat forward.



Electric Stapling Machine Fastens 30 Sheets a Stroke

Operating without levers, an electric stapling machine fastens up to 30 sheets when paper or other material touches its concealed control. Each stapling stroke is automatically adjusted to the thickness of the insert. It can also be used for saddle-stitching small booklets. To keep track of production and to warn an operator when to reload, a counter registers the number of staples used up to 999.

Terraced Garden Grows Strawberries

You'll make economical use of your garden area with a pyramid bed especially designed for growing strawberries, but also suitable for flower gardens. The bed consists of five aluminum bands, each five inches wide but of varying lengths. These bands hold the soil mixture and permit the planting of 75 strawberry plants in a six-foot circle. A core of sharp sand in the center carries water down to all sections.



Molding Protects Car Finish

Car-window molding, usually painted in an ornate wood-grain design, is protected from scratches by lengths of plastic that fit snugly over the sills. The plastic is held in place by wire spring clips. The molding completely covers the inner section of the window sill.

Providing greater safety through increased visibility, the 1949 cars have 30 percent more glass area than prewar models.



By Chet Beer

Los Angeles Professional

A GOOD GOLF SWING is an extremely simple mechanical action like the opening and closing of a garden gate.

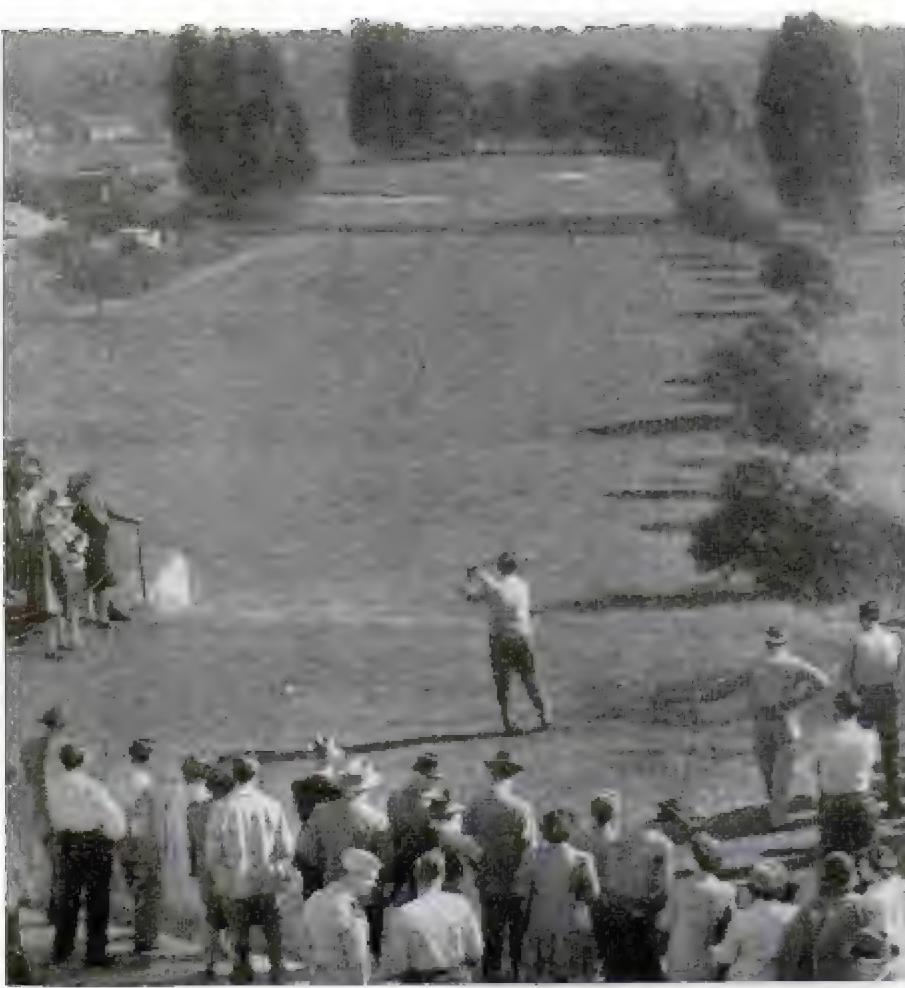
A gate is built to swing back to its original position after being swung open and that's what you are trying to do when you swing a golf club.

Some players don't seem to understand that. They try to adapt golf to their own muscular habits instead of training their muscles to conform to a mechanical swing.

An easy way to learn the swing that I teach in individual lessons and in class instruction is to divide it into four parts or numbers. Each part is simple to learn and when performed correctly you are bound to get a good clean hit.

Part one is to hold the club in the left hand and take your position preliminary to swinging at the ball. With palm outstretched, curve the fingers of your left hand around the shaft and then lay your palm across the top of the shaft so that your thumb lies flat against it, just to the right of its center line. This may feel like an awkward grip until you become used to it, but there's an advantage in holding the club this way; it helps force your left arm into an extended position.

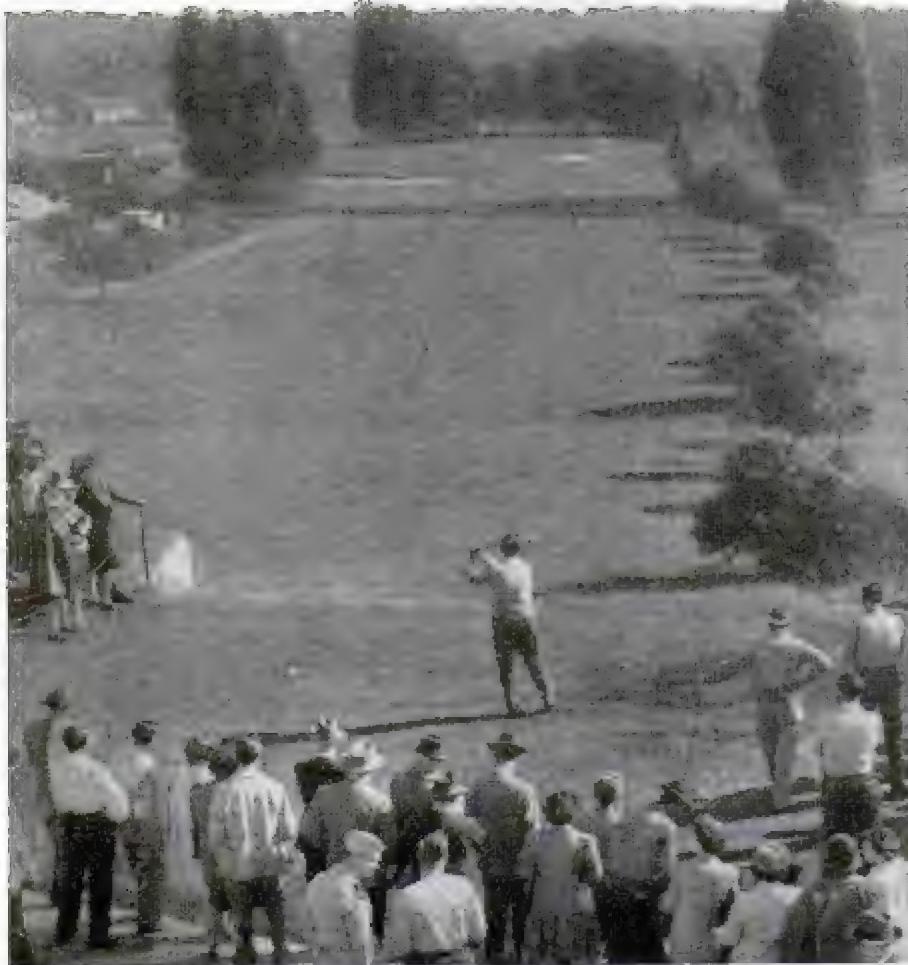
Holding the club, extend your left arm so that the club head is just behind the ball. Stand with your feet as far apart as the width of your shoulders, with the ball in line with your left heel. Your



After ball is hit, professional Chet Beer continues his swing until both hands are again shoulder high. Both wrists are relaxed at the completion of the stroke

Swing Like A Gate

With "gate" swing, curved line shows where club head rides along briefly behind ball on straight line of flight path, adding extra yards to drive



knees are bent slightly to eliminate tension and your body is inclined forward slightly from the hips. The club and your left arm form a straight line.

Part two of this lesson is to reach down with your right hand and place it on the shaft just forward of your left hand, palm down, with the right little finger overlapping the left forefinger and with the right thumb lying along the shaft just to the left of the shaft's center line.

Reaching out to grip a club in this way forces your right shoulder down and causes you to flex your right knee a bit more. Your left shoulder is high and your left side is extended, as they should be all through the swing.

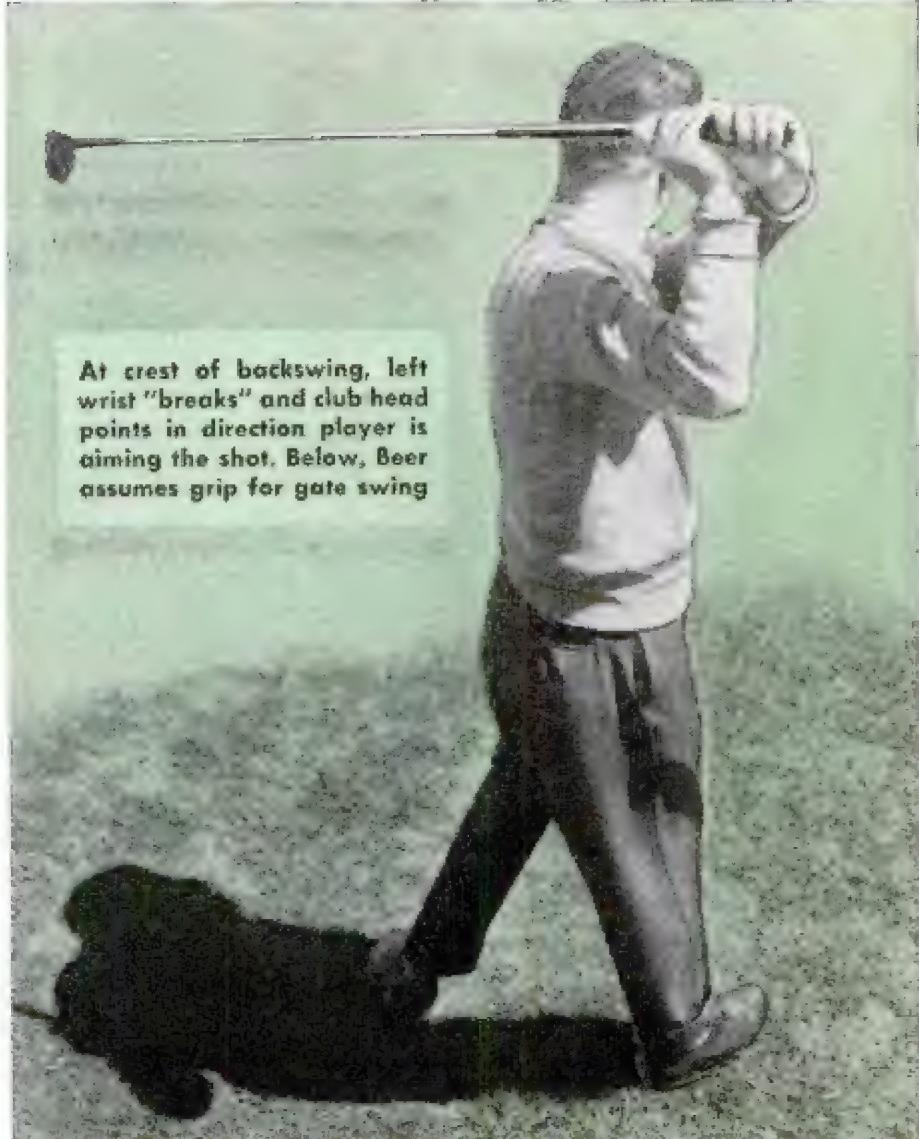
You are now in the basic position, ready to swing in imitation of the garden gate. Your head and your left foot are to serve as the hinges, and your extended left arm and the club are to act as the gate itself.

The third step is to turn your right hip away from the ball, allowing your left heel to rise, and thus rotating your body to the right on its own axis. Raise your arms to the right at the same time, shoulder high, and then allow the left wrist to "break" or cock so that the club continues swinging until it is pointed toward your objective.

Your position at the top of the backswing is this: Your head has moved as little as possible and your eyes are still fixed on the ball. Your shoulders have turned so that they face away from the line of flight. Your left arm, still extended, is holding the club horizontally and parallel with the line of flight, behind your head.

Try this demonstration: Addressing the ball just as if you planned to swing and hit it, raise your arms

At crest of backswing, left wrist "breaks" and club head points in direction player is aiming the shot. Below, Beer assumes grip for gate swing





At start of swing, left, club is straight extension of left arm. As the club is brought back, center, golfer turns right hip away and lifts left heel. At backswing's highest point, right, club shaft is parallel with line of flight

straight out in front of you and cock both wrists so that the club head swings back over your head. Then rotate your body to the right, coming up on your left toe. Try your usual backswing and then this demonstration exercise a few times alternately, trying to achieve the demonstration position in your swing.

Step four is to swing down at the ball, hit it, and follow through. This whole forward swing must be done in a precise way. First, straighten your left wrist so that the club is swung up from its horizontal position behind your head and once more becomes an extension of your left arm.

With your body still in its turned position, sweep your arms down at the ball. Swing your arms down, not out. You must deliberately refrain from rotating your

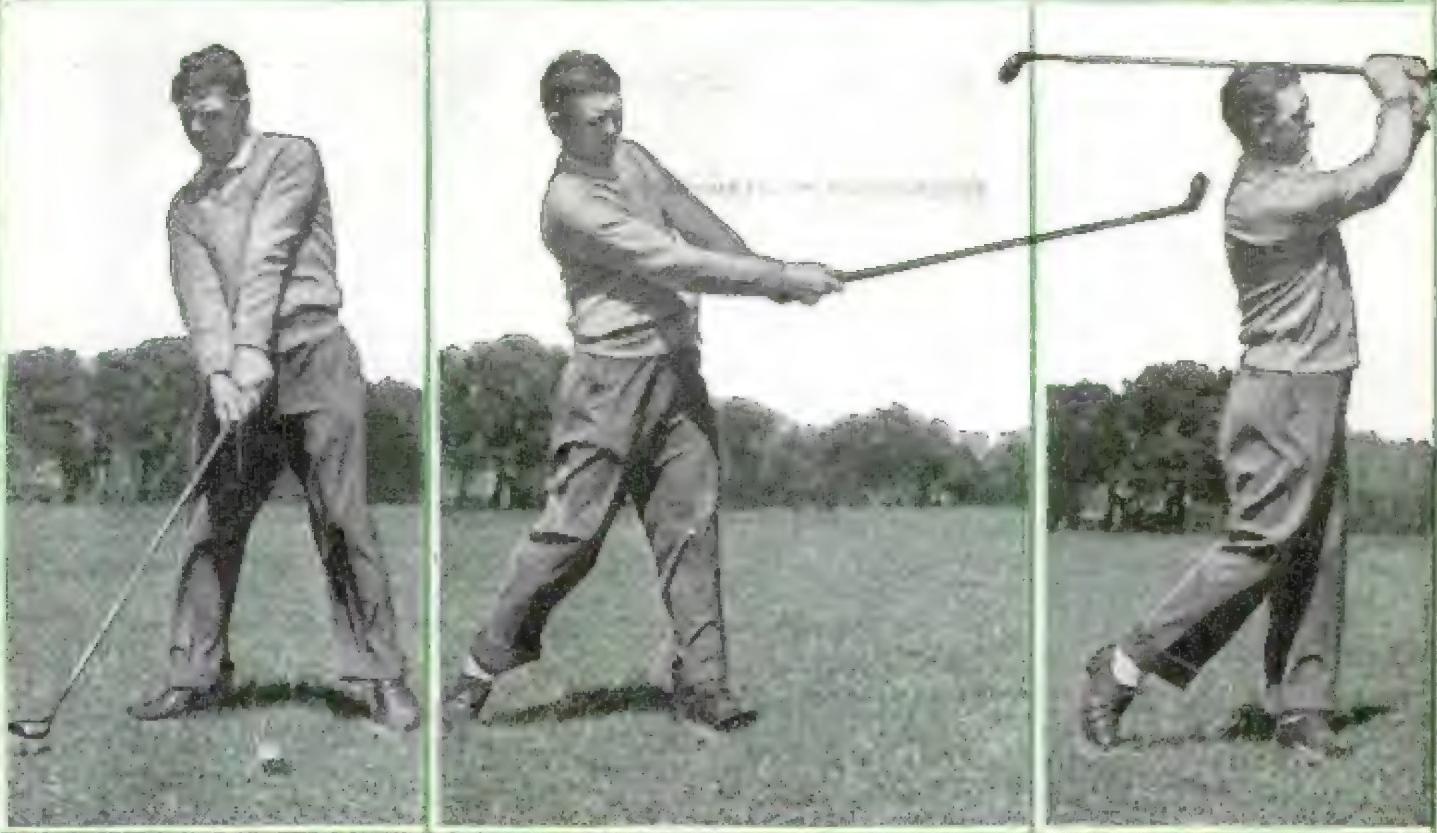
body back to its original position during the downswing. Your arms automatically take care of that action.

During the downswing, your right elbow comes in against your body, forcing your body to the left in a lateral movement. This in turn pushes your left heel down to the ground again. Thus, at the moment of impact you are in the same position from which you started your backswing. Left arm, club and club head are all lined up with the ball. The lateral movement of your body now permits the club head to "ride" the ball for a short distance, tremendously increasing its flight.

Your swing doesn't end when the ball is hit. Continue to swing, with the club extended, until your hands are shoulder high once more. Then, let your wrists relax so

Before putting, golfer studies curved path the ball must follow toward cup to counteract slight dip in green





Downswing, left, is made with arms alone. Center, the swing slows down after—not before—ball is struck

When follow-through is completed, the player's position is reverse of that at top of backswing

that the club head swings over your shoulder, horizontal and parallel once more with the line of flight. This follow-through allows you to hit the ball when the club head is traveling its fastest and gives your arms space in which to slow down.

The swing I've described produces a hard-hit ball that has a long flight. The ball starts out low and climbs away from you in a straight, flat trajectory. It has considerable roll after landing.

This full swing should be used for all tee shots and for all long fairway shots. Short iron shots to the green are played with the same stroke, except that your body need not be turned as much away from the ball, and the backswing and follow-through are shortened.

If you have a chance to watch professionals in a championship match, you may think at first that each one has a style of swinging that is all his own, unlike most of his competitors. But on analyzing their swings you will realize that each is using the basic swing that I've described, modified some by his own characteristics.

Practice will develop this swing until it becomes natural to you, and a public driving range is a good place for practice. On the driving range, too, you can overcome any faults that you may have.

But don't try to figure out what you did wrong if you fail to hit the ball cleanly. Simply go back over the four parts of the swing I've described, perform each part as it has been told here, and try again.

Playing medium irons calls for less extreme body turning and arm raising than in hitting woods for distance





Shoulder Holder Steadies Camera

Camera movement during exposures is cut to a minimum by a shoulder support that adjusts to hold the camera at either waist or eye level. The shelf on which the camera is mounted folds back into the frame for compact storage. Two shoulder clips fit over the shoulders, leaving the photographer's hands free and yet holding the camera securely.



High-Speed Wood Bit

High-speed boring in either soft or hard wood is done with a flat bit that bores in any direction, regardless of grain or knots. Designed for use with power drills, the bit has a long pilot that will start holes at angles as small as 45 degrees. Chips unload



These are sugar-beet seeds. At right, their natural size; at left, the same seeds after being pelleted

Seed Pellets Eliminate Thinning

Seed pellets make life easier for the home gardener by virtually eliminating the backbreaking chores of thinning and transplanting fragile seedlings. When coated to form pellets of pea size, such tiny seeds as carrots can be planted one at a time, properly spaced for sturdy plants. Used commercially for several years, the seed pellets are now available for home gardens. Seeds are coated with a mixture of soluble materials containing fungicides, insecticides, fertilizer and hormones, plus inert ingredients to add bulk. The coating also protects the seed, making it possible to plant in the open two or three weeks earlier than usual.

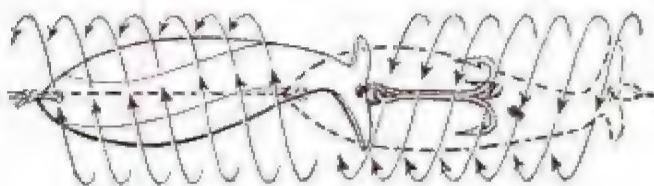


continuously without clogging the bit, which operates best at speeds of 750 to 3500 revolutions per minute. The bit can be sharpened quickly with a regular flat file and drills through Masonite, Bakelite and Lucite without chipping. A standard set contains six bits from $\frac{3}{8}$ to 1 inch and one countersink, all having $\frac{1}{4}$ -inch shanks.



ROLL OF SPOON

REVERSE ROLL

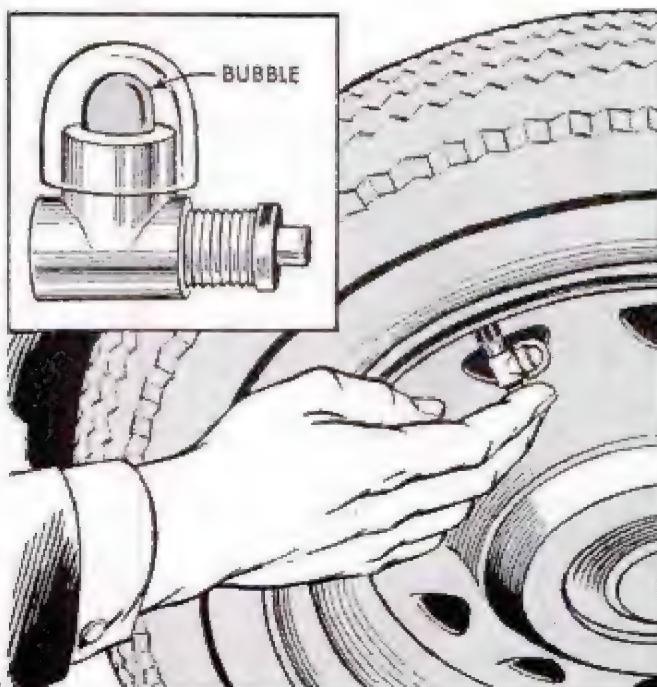


Nontwist Reversing Lure

Twisted fishline is avoided with a spoon lure which reverses itself as it travels through the water with a flash-roll action. After five to seven rolls, pressure on the curved tail causes the lure to reverse its direction of roll. Various retrieving speeds may be used without loss of action. The lure is available in three sizes and several different color schemes.

Valve Cap Has Built-In Tire Gauge

Checking tire pressures takes only a few seconds when your tires are equipped with individual pressure gauges that take the place of the regular valve caps. You simply press down a plunger on the gauge and, if your tire pressure is all right, a red bubble appears in a plastic window. If no bubble appears, your tire needs more air. The gauges are available for all standard tire pressures used on cars, tractors, motorcycles, trucks and aircraft.



Dispenser Applies Cement To Dry-Wall Sealing Tape

Tape for sealing the joints in dry walls goes on up to five times faster when the workman uses a tape and cement dispenser. The new machine, weighing only eight pounds when fully loaded, applies cement to the tape as it is fed from the applicator. The amount of cement used can be controlled. A built-in device cuts the tape at the desired length.

Ruler Fits Notebook Rings

Designed for carrying in ring-binder notebooks, a transparent ruler, made of Vinylite plastic, is easily removed or inserted without opening the rings. The ring slots are punched to fit either two or three-ring notebooks. The ruler is suitable for both pencil and ink ruling on either flat or curved surfaces.



PAINT-BOMBING

TO THE PILOT of a low-flying airplane, one tree in a forest looks pretty much like another. Normally, this isn't much cause for concern, but when the pilot is flying a DDT-spraying mission over thousands of acres of trees he wants to know when to start and when to stop.

By paint-bombing treetops, workers in the U. S. Bureau of Entomology provide pilots with easy-to-see markers on each corner of the tract to be sprayed. This technique, worked out by Walter J. Buckhorn of the Portland, Ore., branch of the bureau, brings the maritime line-throwing gun into landlubber service. It involves shooting a line over the treetop, hoisting a paint bomb to the top and exploding it, showering the upper crown with brilliant paint visible to the airman for miles.

When Buckhorn was given the job of marking 12 test plots of 360 acres each in an Oregon forest, he thought there must be some quick way to outline the infested areas for the pilots. He decided upon the line-throwing gun used by Coastguardsmen. The gun he uses is an 1873 model Army Springfield, .45-.70-caliber, with about half the barrel sawed off. Instead of a bullet, the charge fires a six-ounce brass projectile that is about a foot long. Loaded through the muzzle, the projectile has an eye in one end to which is tied the end of a roll of twine. When the projectile is fired, it yanks a "tail" of twine out of a canister clamped to the muzzle.

By trial and error, Buckhorn perfected the paint bomb he needed. He took an ice-cream container of waxed paper and filled it with paint. In the paint he placed a quarter of a stick of dynamite, capped and wired. The detonation wires come out through a hole in the lid.

With this equipment, painting the treetop is simple. Buckhorn, standing about 150 feet from the tree, fires the

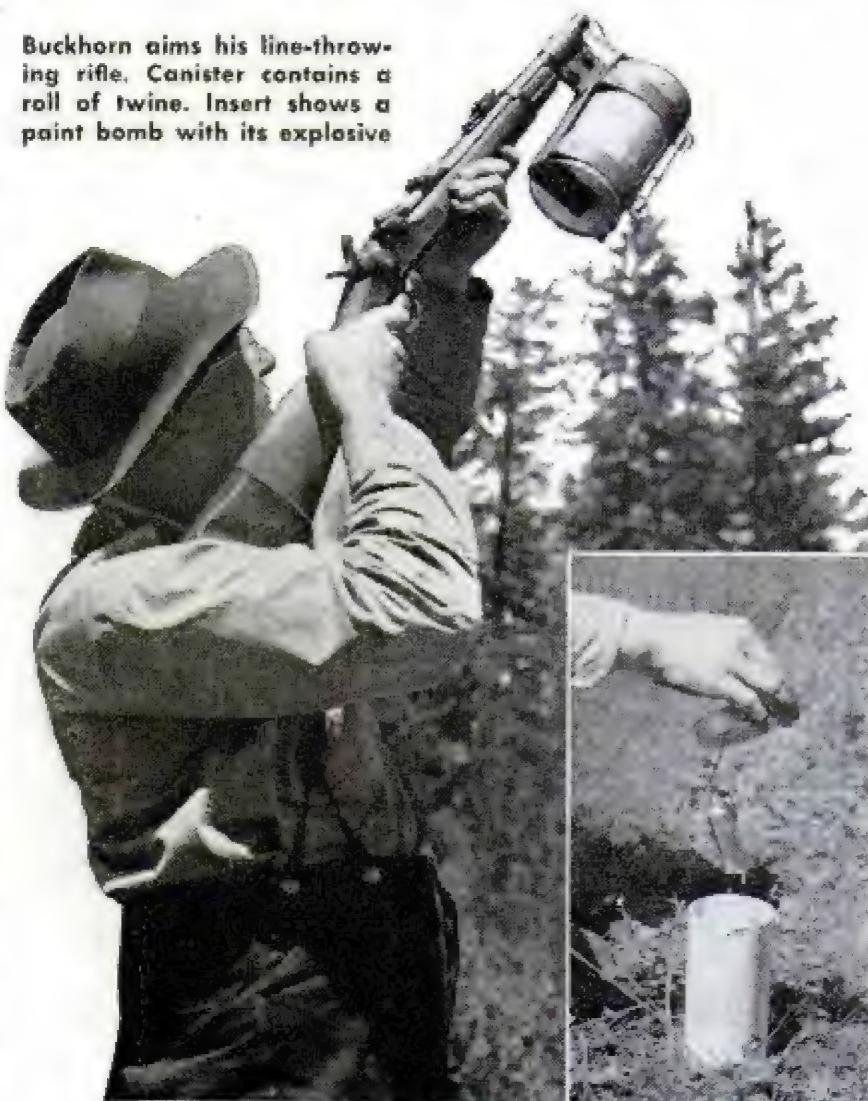
projectile over the treetop. On the opposite side of the tree, an assistant picks up the end of the line and pulls the paint bomb, which Buckhorn has tied to his end of the twine, up to the top of the tree. By manipulating the detonation wires as the bomb is hauled upward, Buckhorn keeps it from tangling in the limbs.

Once the bomb is at the top, he touches off the explosive with a battery. The explosion sprays paint around in a thick cloud, coating the foliage.

The DDT spray over the 12 test plots was so successful in insect control that plans are being made for spraying 1½ million acres of forest lands.

Buckhorn's paint-bombing technique is expected to be a big help in other work as well. Already, plans are being made to use it to guide pilots who make aerial surveys and photographic maps of forest lands.

Buckhorn aims his line-throwing rifle. Canister contains a roll of twine. Insert shows a paint bomb with its explosive



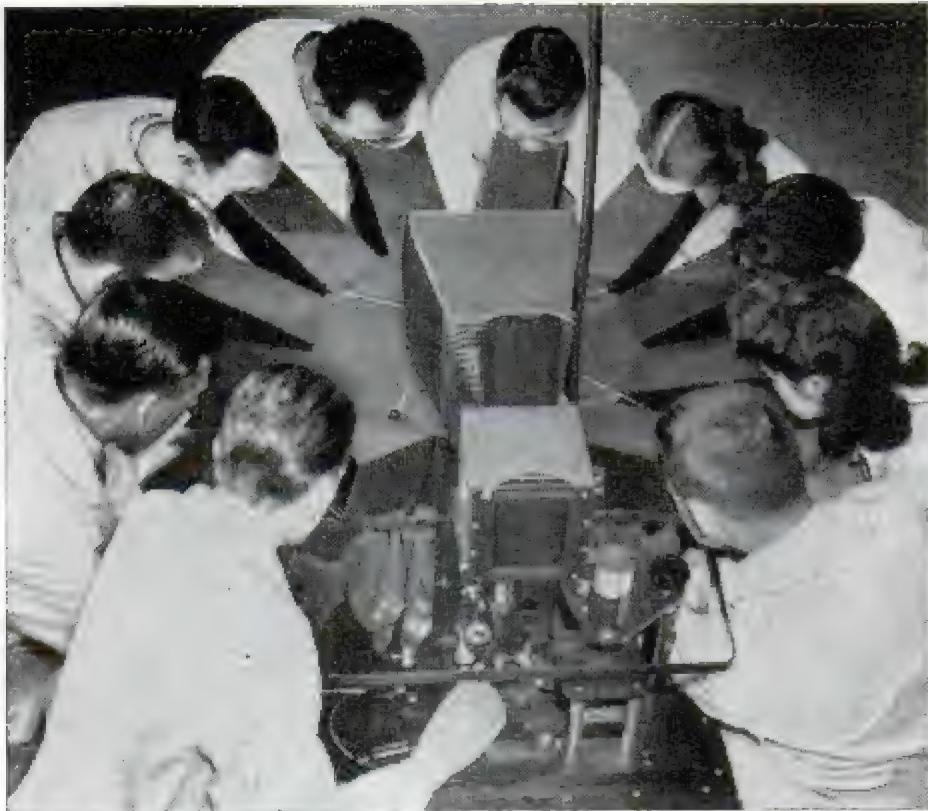
TREETOPS



Left, after the line is fired over the treetop, the paint bomb is tied to one end and hoisted to peak of tree as shown here. Detonation wires run from bomb to ground. Above, paint bomb is exploded in crown of tall Ponderosa pine. Note the paint cloud around treetop. Below, guided by painted treetops, helicopter sprays forest



U. S. Bureau of Entomology photo

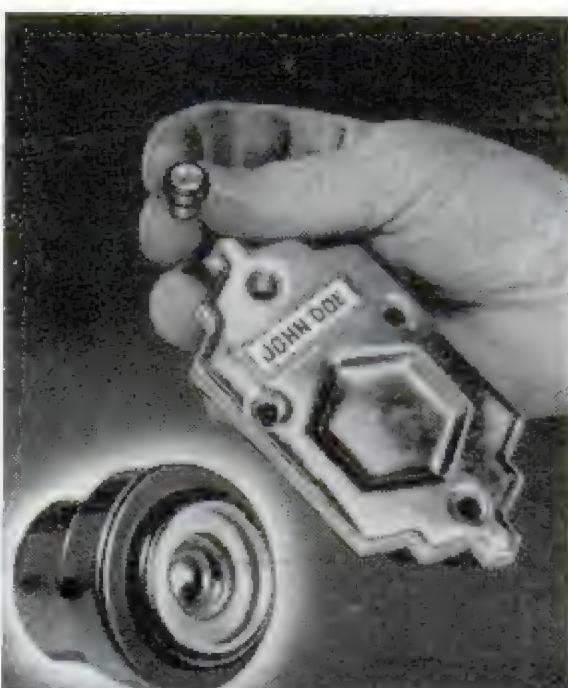
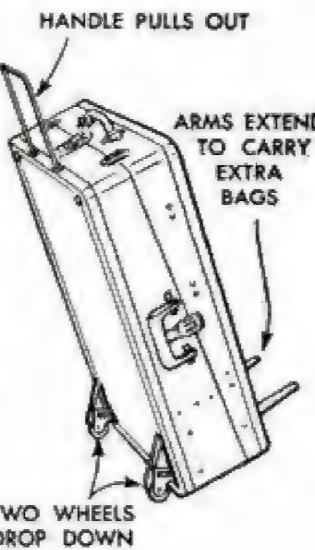


Group Microscope Has 10 Eyepieces

As many as 10 doctors and technicians can study a slide simultaneously under a multiviewer microscope that projects the image on individual viewing screens. The 10 eyepieces are arranged in a circle around the machine. The doctors can call attention to any portion of the slide by means of convenient control handles that move a small pointer across the screens. The instrument can also be used to project the slide on a wall screen. Used for group instruction in the study of tumor tissues, the instrument costs \$2500.

Rolling Luggage

Luggage equipped with a "retractable landing gear" can be rolled instead of carried. Two miniature wheels pivot out of one end of the wardrobe case, and a handle can be pulled from the opposite end. The suitcase then can be wheeled around like a pushcart. If the traveler has more luggage to manage, he can pull two extension arms out of the bottom of the case and pile the extra pieces on top of the rolling wardrobe unit.



Tiny Lens in Door "Inspects" Visitors

Through a wide-angle lens installed in a peephole in the door, homeowners can see visitors from head to toe before the door is opened. The lens, only a fraction of an inch in diameter, is secured by a brass, chrome or bronze plate.

The manufacture of portland cement involves such diverse equipment as a 600-ton kiln and a balance sensitive enough to weigh the dust from a butterfly wing.

IRON STRIKE in Labrador



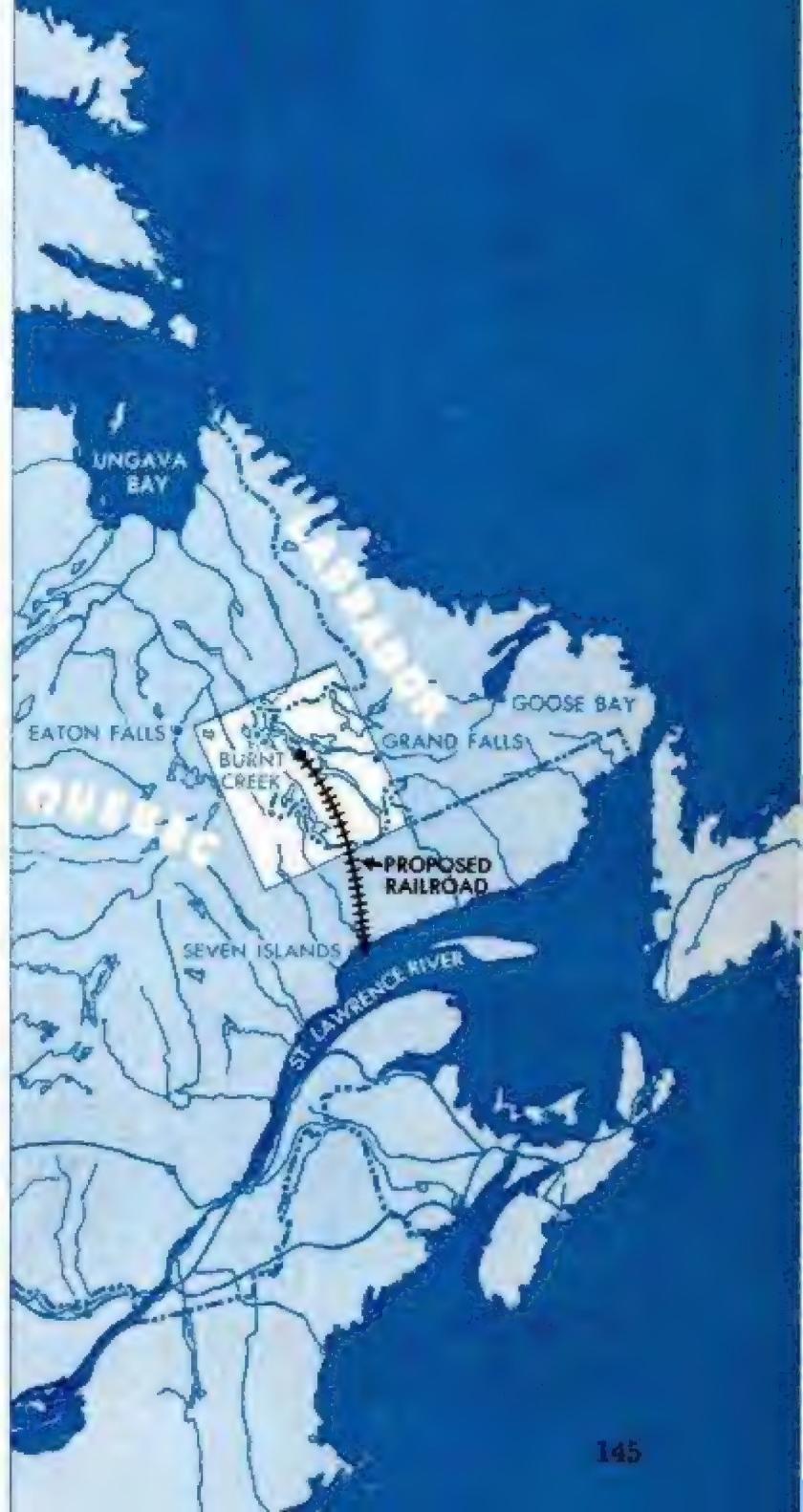
Deep in the northland, along the Labrador-Quebec border, lies one of this continent's richest iron-ore deposits. Map, below, shows the location. Left, modern prospectors use pneumatic drills in search for valuable ore.

By James Montagnes

TWELVE years ago, Mathiau Andre, an Indian trapper, strolled into Seven Islands, Que., carrying some "pretty rocks" he had found while setting a trap line near the Quebec-Labrador border. His pretty rocks turned out to be extremely high-grade iron ore. Taken back into the unexplored wilderness by airplane, he pointed out that spot where he had picked up the rocks. Subsequent drilling has shown that he discovered what may be the biggest iron strike of the century.

Today, the area from the St. Lawrence River north to Ungava Bay seems destined to be the Mesabi of tomorrow. Prospectors, geologists, financiers and laborers are becoming acquainted with this desolate part of Canada, which a few years ago was unexplored wilderness.

Planes fly into the area from Seven Islands every day and plans are being made to construct a railroad into the iron-ore country. The center of activity is Burnt Creek, a



small mining community of 215 population. This primitive settlement, reminiscent of the gold-rush days, is sitting on one of the richest deposits of iron ore ever discovered. A test drilling located ore only two feet below the surface and was still bringing up good ore when drilling was stopped at 367 feet!

Distance was the main factor in starting a mining development in the Labrador area—distance from the nearest center of civilization, from transportation and sources of power to operate the mining equipment. By air it is close to 400 miles northeast of Quebec City to Seven Islands, a small settlement and fur post on the St. Lawrence River. There is no railway; you go by air or boat to get to Seven Islands. From a base there, air services have been flying in men and supplies to the new iron-ore fields 317 miles farther north.

This iron find in northern Quebec and Labrador is important to the North American economy. It means an ample supply of rich ore for the steel mills of the Great Lakes region and possibly new steel mills on the Atlantic seaboard and throughout eastern Canada. This is important in view of the signs of depletion of the best ore areas in the Minnesota iron ranges. Ore will be shipped from the Labrador area by train to Seven Islands and from there will go by steamer either to Great Lakes or

Diamond-drill crew in northern Canada hauls a core sample of iron ore out of the ground. Below, only 70 miles from the Quebec-Labrador deposits, Eaton Falls is expected to be used to produce electricity

Copyright Photographic Survey Co. Ltd.



Atlantic seaboard steel mills. It is expected that there will be sufficient iron ore in the Labrador region to stimulate completion of the St. Lawrence Seaway, to make for more economical shipment of iron ore by the largest lake freighters direct from Seven Islands to the steel mills of the Great Lakes.

The iron-ore development in this new frontier region is not a pipe dream, for the companies exploring and planning development there have already spent millions on exploration and plan to spend many more. They include some of the biggest mining interests in the United States and Canada, in many cases Canadian gold-mining interests working closely with iron interests from the United States. Long-term exploration concessions have been granted some of the firms by the governments of Quebec and Newfoundland, the latter having jurisdiction over Labrador.

In the major iron-ore development, a large Canadian gold-mining company and a major United States steel company have joined forces to map out 300 million tons of iron ore, enough to keep mining going for at least 30 years. They have been drilling and working in that area since the end of the war. Their search has succeeded to the point where they are now seeing their

minimum ore fields prospected. The railroad they plan to build will run from Seven Islands, on the St. Lawrence River, north into the development. A charter for the railway has been obtained and it is to be started by 1950. The development covers a concession of almost 24,000 square miles, most of it in Labrador.

So far, all transportation into the iron-ore site has been by air. By river, with many portages, it would take too long. By air, the trip can be made in less than two hours. Everything has been flown in, from men to bulldozers to make rough roads in the rocky country. All food comes in by air. Diamond drills, materials for houses, materials to set up chemical-analysis laboratories, ore dump carts and trucks, machinery of all kinds have all been flown in by contract air-freight service and by a subsidiary air-transport company of the mining interests. Even the airports and landing strips had to be built for summer operations after the first supply planes came in during the winter to land on the snow of northern lakes.

When the mining operations actually start, electric power will be developed for the mines from the numerous fast-flowing rivers of the hilly area. The main iron-ore "find" to date is not too far from Grand

Burnt Creek camp is the center of the exploration activities in the Quebec-Labrador iron-ore development
Copyright Photographic Survey Co. Ltd.





All supplies are flown into the Burnt Creek camp. This Burnelli transport is being loaded at Seven Islands

Falls on the Hamilton River. A series of falls on the river drops it 800 feet in a short distance, biggest drop being 302 feet. This is considerably more than the drop of Niagara Falls. Another important source of power will be at Eaton Falls, about 70 miles northwest of the site.

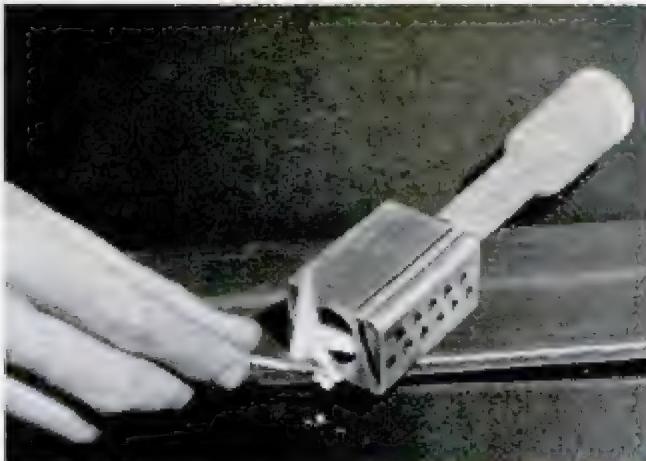
As in other parts of northern Canada, electric power will be generated in the northland of Quebec and Labrador long before there are any towns or cities in that area. The power will be used by the mines and as the mines grow, the towns and cities will come to the frontier.

As an example of what this new iron-ore development means to northern Canada, it is but necessary to look at similar devel-

opments in other parts of the northland. In northern Manitoba, for instance, a copper mine in the bush, 400 miles north of Winnipeg, has become a thriving town of over 5000 people in a matter of two decades. The town has all the modern conveniences of any other town its size, only there are no roads out of the town for a drive; the roads lead only into the bush. Much farther north, gold finds on Great Slave Lake have brought into being the town of Yellowknife, largest community in Canada's vast Northwest Territories. Similarly, mining operations in Labrador will see new towns spring up in what is today only wilderness, largely unexplored, and inhabited only by a few Indian trappers and Eskimos.

In the barren surroundings of desolate northern Canada, drillers hunt for the red metal





Waxing Iron for Skis

Skis can be waxed without thawing them when a small self-heating iron is used. The iron holds a supply of heating disks. When the skis are to be waxed, one of the disks is placed in an opening in the iron and ignited with a match. In about two minutes the aluminum iron is hot and wax is held against it until melted wax runs down a groove and onto the ski. The skier then moves the iron over the ski to spread the wax. A curved edge of the iron rubs wax into the ski groove.



Electric-Eye Street Lights Turn Themselves On and Off

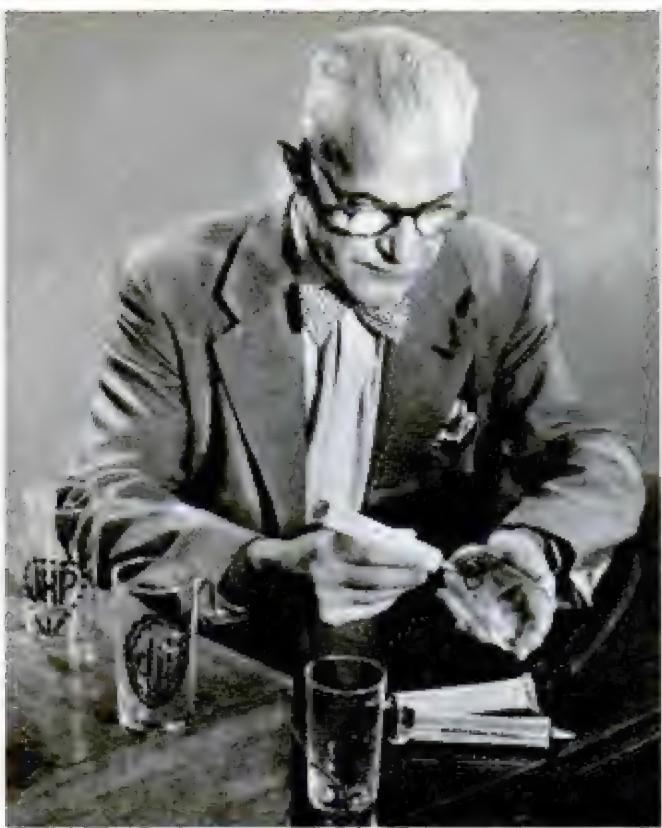
When it gets dark enough to make vision hazy, individual street lights can now turn themselves on with an electronic eye that "sees" dusk and dawn approaching. The electronic control, small enough to be mounted in the top of each lamp housing, has a peephole through which the outside light is measured by a phototube. As light intensity in the immediate area drops low enough to make artificial lighting desirable, the light goes on. When dawn brightens the area, it goes off. Most control units used today turn entire circuits of lights on or off at a predetermined time regardless of light conditions.



Crank-Up Garden Umbrella

Opening a new garden umbrella and tilting it into the sun is as easy as turning two cranks. The cranks are located on the support pole just above table-top level. One of them tilts the umbrella and the other raises or lowers it. A transparent waterproof covering protects the umbrella during rainy weather. The umbrellas are available in seven and eight-foot sizes in a large selection of colors and in solid or striped patterns.

In soil-conservation projects, the Department of Agriculture has planted 33,650 miles of field windbreaks in the West.



Embossing Plastic

If you're artistically inclined, you'll enjoy working with a plastic that is squeezed from a tube to emboss everything from gift packages to drinking glasses. The plastic comes in several colors and adheres to cloth and leather as well as to smoother surfaces. When applied to any hard surface, such as glass or china, it can be removed easily if desired.

Internal Pipe Wrench

Fittings that break off inside pipes are easily removed with an internal pipe wrench that is turned with a monkey wrench. The tool has only one moving part, a knurled cam that slips into gripping position inside the pipe. It is available in four standard pipe sizes.



Lacquer-Deposit Calculator

Lacquer deposits on engine pistons are measured quickly with a high-voltage instrument. One terminal is attached to the piston and the other to the deposit. The instrument then measures the amount of voltage required to burn through the lacquer. Since it takes a known amount of voltage to penetrate a given lacquer deposit, the thickness of the deposit can be calculated. The instrument eliminates the former technique of removing the deposits by hand and then weighing them.

Magnet Holds Soap High and Dry

Suspended by a magnetic holder, a bar of soap remains dry and handy for instant use. A magnet, mounted in a wall bracket, attracts a steel ball that is attached to the soap by a notched stem. When the soap has to be replaced, you remove the steel ball and insert it in a new bar.

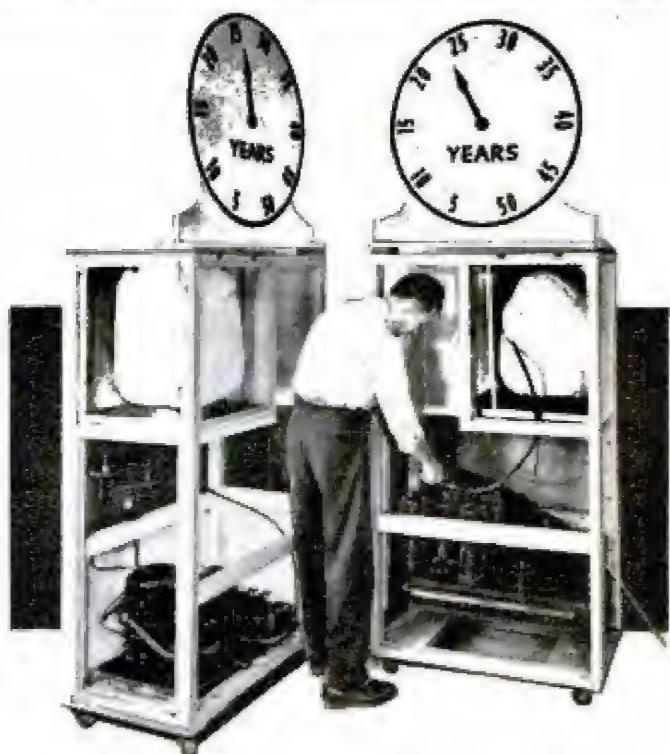


Refrigerator inspector peers through a quartz-glass viewer to check the metal hood that will encase the mechanism. Casing is filled with hydrogen. Bubbles will appear if there are leaks. The quartz viewer cuts murkiness of the water, making it possible to see the smallest bubbles



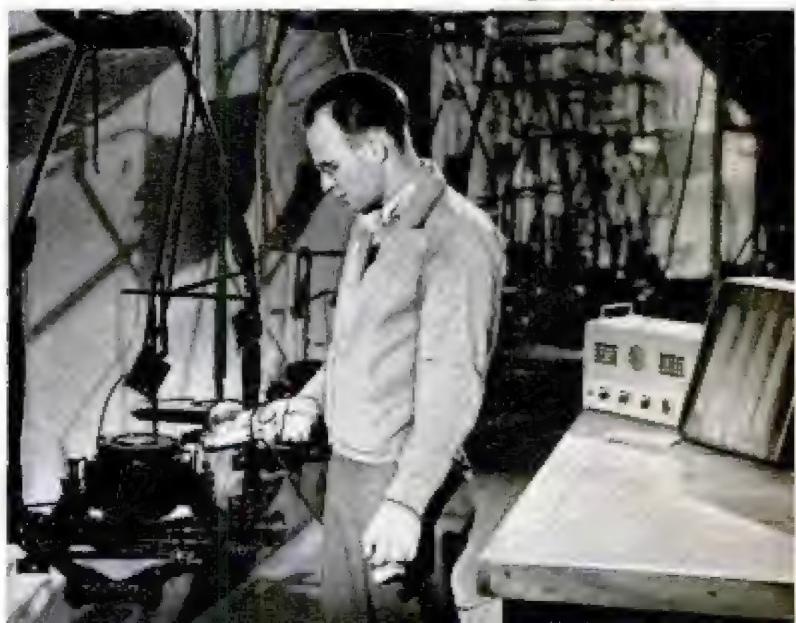
getting the cold facts

Before a refrigerator reaches a corner of the kitchen, it passes through a series of exacting tests to check its efficiency. It must pass leak and noise tests, temperature tests and durability checks under the critical eyes of men and instruments. Inspectors also learn much from refrigerating units that have been in operation for years. At right are shown two such units, one operating constantly for 25 years, the other 28 years. Note the frost that has built up around the freezing compartments. As individual parts break down, they are replaced during "off" cycle of the mechanism. Below, black-light beam is thrown on a compressor to spot possible oil leaks. Oil appears as white spot under the rays



↓ Crystal microphone is held against the mechanism to determine the amount of noise the unit produces

Frigidaire photos





COOLING UNIT will make your bedroom or trailer comfortable during the hot nights this summer. It mounts outside the window and disperses 800 cubic feet of filtered, washed and cooled air per minute

TAPER LIGHTER, below right, is a long mechanical match with which you can light gas heaters and burners easily. The striking unit slides up the tube to ignite the wick. It uses cigarette-lighter fluid

BATHTUB HEADREST makes reading or just plain relaxing in the tub a comfortable pastime. Suction cup holds it firmly against the sloping end of the tub. The headrest is cushioned with sponge rubber



ICE BALLS instead of cubes are the newest idea for cooling drinks. They're frozen in rubber trays that release one at a time when pressed on the back

WHAT'S NEW *For Your Home*





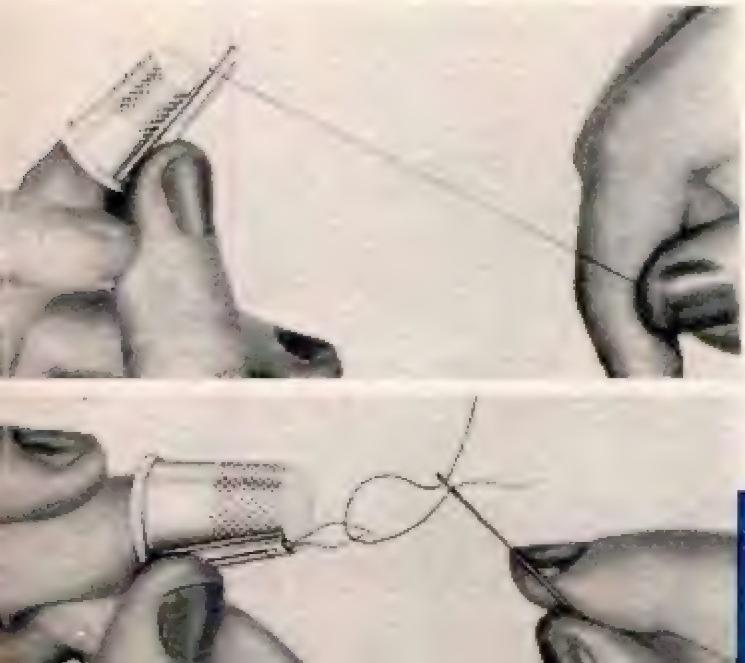
BOTTLE RESEALER locks in the carbonation of soft drinks. A safety valve releases any pressure above 45 pounds to prevent explosion if heated or shaken

CHILD EATS eagerly when he "shares" his food with plastic puppy that sits beside bowl, top right. But food falls back into bowl so child gets all of it

FLOWER PLANTER, right, has an attractive loop fence around the leakproof container. You hang the planter on wall by placing loops over nails or hooks

PUSH-BUTTON COOKING is here with an electric range, lower right, controlled by buttons that glow with colors which show the heat intensity being used

NEEDLE THREADER and knife are both part of a handy thimble. Thumb pressure slides the knife out for cutting. Wire loop pulls thread through the eye





Ambulance With Wings

Standing by on airfields throughout Saskatchewan, Can., are plane ambulances, ready to fly anywhere on the prairies to pick up medical patients who must be rushed to a hospital. The ambulance service is operated by the government and may be called into action by any doctor or responsible citizen. The plane closest to the patient then is dispatched and makes a landing on any reasonably level field in the vicinity. A nurse accompanies each air ambulance. The patient is carried on a stretcher which is loaded through a wide cargo door and secured to the cabin floor. The interior also has three seats for the nurse and relatives of the patient. If



Top, left, local doctor and farmer wave flying ambulance in for landing. Top, patient on stretcher is hoisted through wide door. Above, winged ambulances always stand ready for emergencies

required, a second stretcher can be substituted for two of the seats and a third patient can be carried on a mattress on the floor. Skis are used instead of wheels on the landing gear throughout the winter.



Auto Tray

Eating in an automobile is a pleasure instead of a juggling act with an aluminum tray that attaches to front or rear-seat backs. A simple ratchet setting adjusts for either seat and rubber-sleeved arms protect the seat covering and hold the tray firmly. The tray was designed chiefly for drive-in eating places, but it can be used on outings and for travelers who like to eat in their cars.

Tides flowing over the earth produce a friction which is slowing its rotation at a rate that will make the day a second longer in 100,000 years.



BLANKET OF FOAM SAVES TRUCK

For five years fire engineers have been trying to burn up an old oil truck, but each year a blanket of foam foils the flames. Recently, during the demonstration of a new 12-ton airport crash truck, the oil truck and the surrounding area were doused with 200 gallons of high-octane gas and fuel oil. When the fuel was ignited, fire and smoke obscured the truck. Then fire-protection engineers smothered the flames with a blanket of carbon-dioxide gas and foam. Multijet nozzles deliver the gas at a rate of 800 pounds a minute and the foam at 2400 gallons a minute. Within 45 seconds, the fire was out and the truck was intact without even a flat tire.

Ring of flame leaps up around the veteran oil truck. Crewmen of the new airport crash truck, upper right, watch fire spread



With black smoke swirling around truck, crew unrolls equipment. Below, left, after 30 seconds of action, a fire-smothering fog hides truck. Below, fire out, the truck is plastered with foam





Roberts rigs model sailing boats which will appear full size on world's screens through Hollywood magic

Hollywood Boatman

By Andrew Hamilton

WHOM IN ALL Hollywood knows more about boats, rigging and equipment than any other one man?

You'll be wrong if you name Charles Laughton because he played Captain Bligh in "Mutiny on the Bounty." You'll score a clean miss if you pick John Ford, Victor Fleming or Tay Garnett, all of whom have directed many sea pictures.

The man you should choose is Benton Roberts, a 46-year-old industrial engineer, musician and graduate of Penn State. He has supplied boats and nautical equipment for more than 1800 Hollywood epics since 1931—approximately 100 pictures a year. What started as a sideline, today provides Roberts with a profitable livelihood for himself and a crew of three to nine men.

"People find it hard to believe that approximately 100 motion pictures containing boat scenes are made each year," Roberts says. "But it's true. Of course, some have boat scenes that are short and unimportant, but others like 'Captains Courageous,' 'Mrs. Miniver' or 'Mr. Peabody and the Mermaid' require weeks of shooting."

If the script calls for a Venetian gondola, Roberts has one that he can truck over to

the studio right away. If a director needs a couple of English longboats, he yells to an assistant who telephones Roberts. If it's a West Indies houseboat that's required—complete with pigs inside and chickens hanging from wire baskets over the gunwales—Roberts can supply it.

Over the past 18 years he has built up a fleet of more than 60 boats of all kinds, shapes and vintages. These range from a sleek, \$20,000 Chris-Craft (which has appeared in more than 50 films) to a crude South American mahogany dugout. In between are dories, dinghies, African war canoes, cabin cruisers, Eskimo kayaks, sampans, English punts, American racing shells, yachts and French longboats. Roberts calls them "character boats." The term is used in the same way that a certain type of actor is called a "character actor."

During World War II the Office of Strategic Services thought so highly of Roberts' collection they bought four of his Philippine-type native canoes. The OSS didn't say what would be done with them. Roberts didn't ask. But a \$600 check was promptly signed and the OSS whisked the canoes away. More than three years later they

were returned. Roberts has reason to believe that they were placed aboard U. S. submarines, taken into the Philippines and used for supersecret intelligence work.

As an engineering student at Penn State, Roberts had no intention whatever of winding up in the boat-brokerage business. But after graduation he came to California and took a job in the engineering department at Hal Roach studios. For several years he was a technician for "Our Gang" comedies. He built such trick props as an automobile that looked like a submarine and an old jalopy that fell apart like the one-hoss shay.

Then came sound motion pictures and the depression. Roberts took a job as pro-

prietor of the West Basin Yacht anchorage in the Los Angeles harbor.

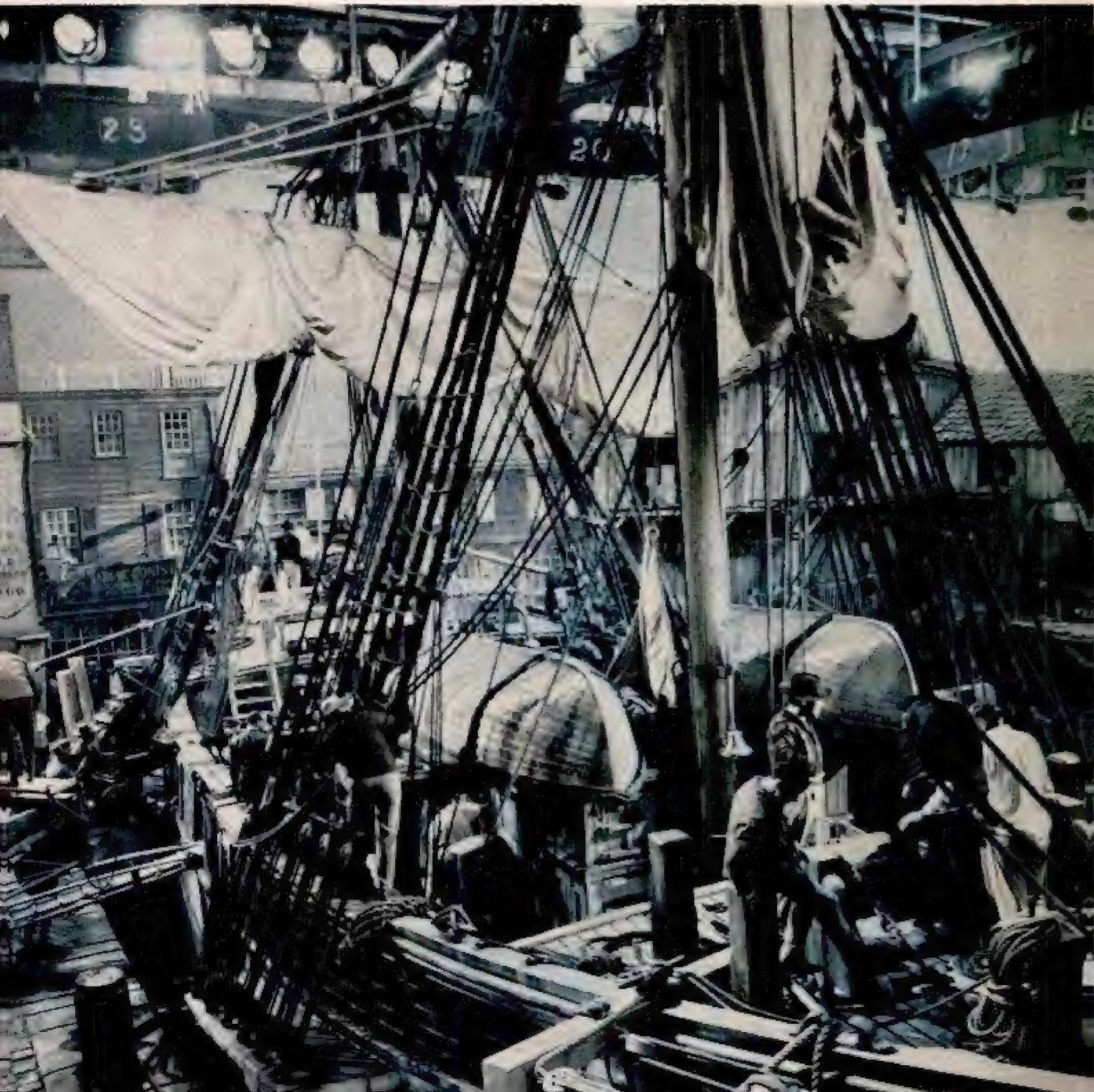
One day M-G-M telephoned and said they needed a couple of yachts for a picture they were making — "Fast Life," starring William Haines. It was easy for Roberts to arrange a deal with the depression-hit yacht owners whose boats were tied up in his anchorage. M-G-M paid them a rental fee; they turned it over to Roberts.

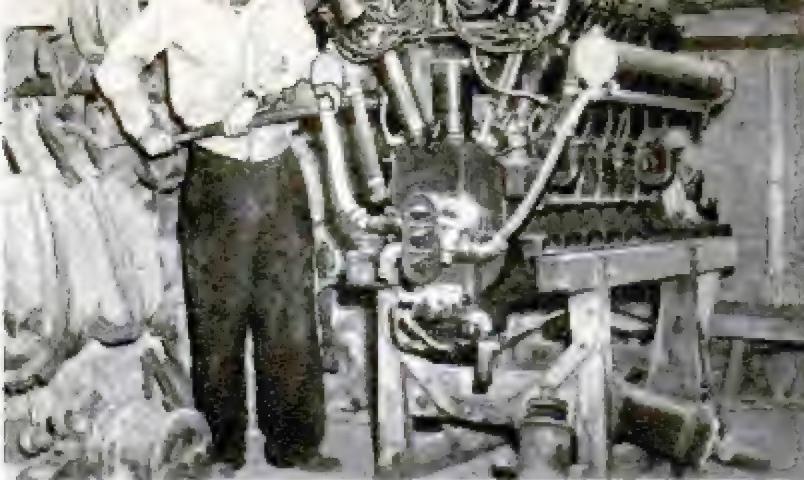
"That was the start of it all," he says. "I worked several pictures for M-G-M. They recommended me to other studios. I've been busy ever since."

As additional orders came in Roberts began to purchase more boats and equipment. He plowed the profits right back into the

Much of Roberts' know-how went into building of the brig, Pilgrim, for the movie "Two Years Before the Mast"

Paramount Pictures photo





Assistant works on Roberts' 1918 Liberty engine, used when the movie script calls for shot of prohibition-days rum-runner engine.
↓ Director of a motion picture may need an armada of small boats, so Roberts keeps several outboard motors on hand at all times



Roberts furnished sloop for movie "Lydia." Water in immediate background is real, breakwater is artificial

business. By 1943 he had collected so much stuff that he had to move from the West Basin in the Los Angeles harbor to Lake Machado, a small, marshy lake about half a mile inland.

There he built a combination warehouse, boathouse, repair shop and dock in which to keep his boats and equipment. On the ground floor he stores his most valuable boats. The loft is chock-full of rigging, sail and hardware. On the basement level, which opens toward the lake, is the outboard-motor shop.

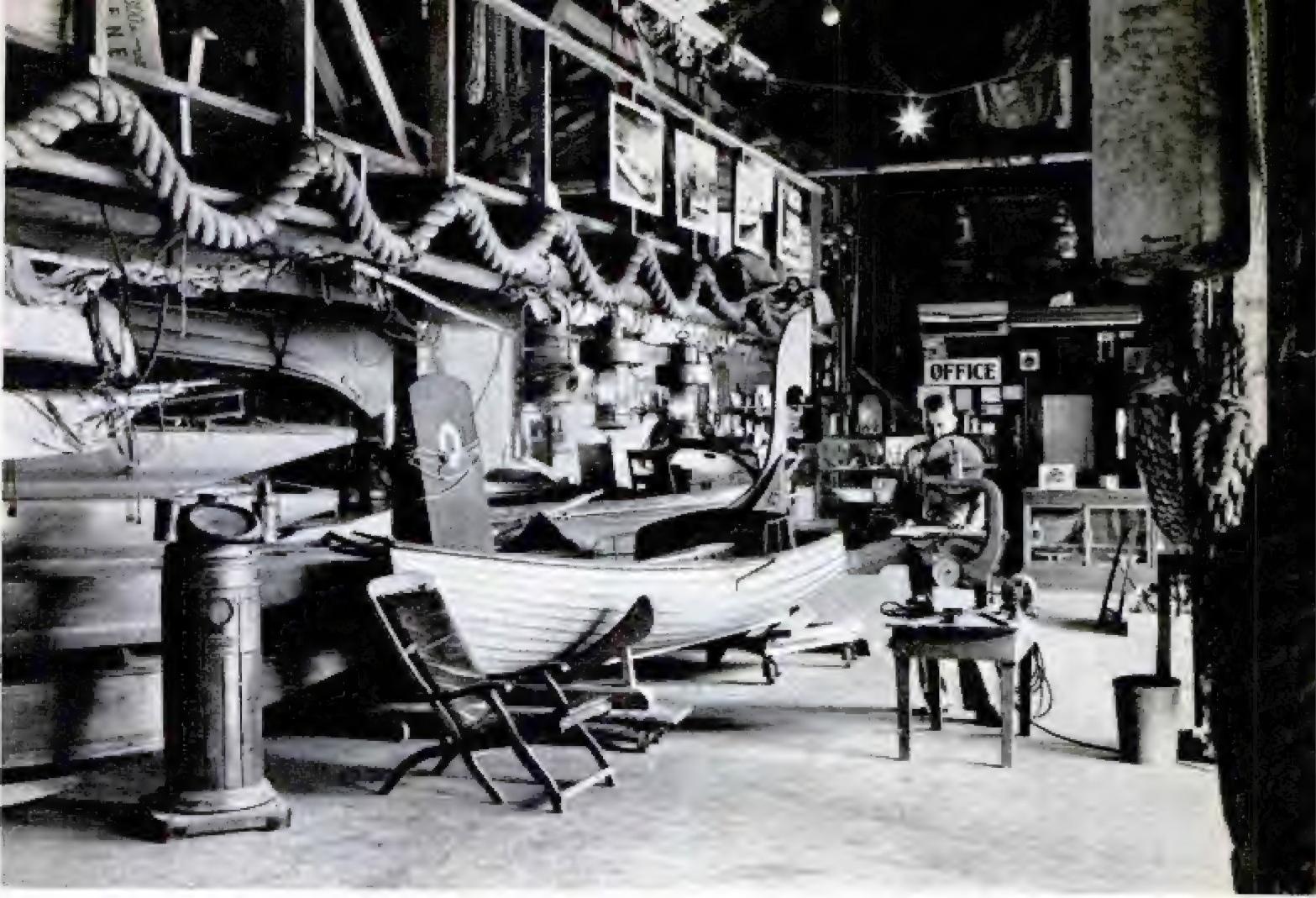
His headquarters is practically a nautical museum. All three floors of the 40 by 100-foot building are overflowing with equipment of many types: lanterns, anchors, oarlocks, oars, boarding ladders, rope fenders, fishing gear, cargo nets, gaffs, binnacles, cork floats, dip nets, fishing jackets, boots, cargo lights, wheels, and capstans—almost anything imaginable that could be connected with boats or the sea.

How much is all this worth?

Roberts takes a long look around: "I dunno. Maybe \$100,000—maybe more."

Not long ago the director of the Harvard Museum was in





southern California. He heard through a friend that Roberts had "quite a collection of boats." He was interested because the Harvard Museum also collects boats of historical interest. But when he saw Roberts' extensive array, he shook his head enviously. "Harvard doesn't have anything like this."

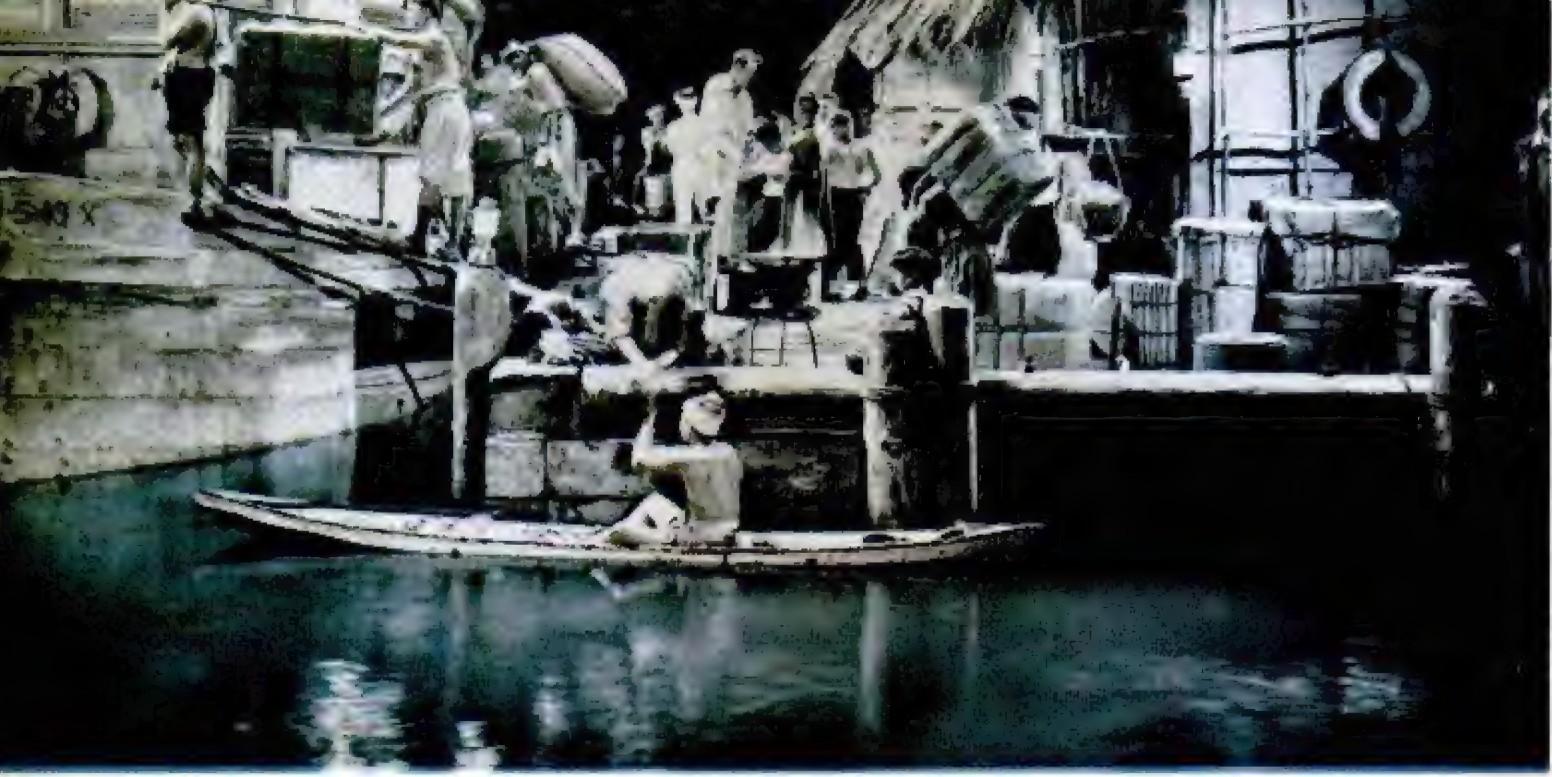
Roberts works on a businesslike basis when he is dealing with Hollywood studios. He never sells, always rents. His terms are 10 percent of the value the first week, 5 percent per week thereafter. Charges range from \$45 a day for a speedboat to 25 cents a week for a life preserver.

"Actually, I try to save the studios money," Roberts says. "I know it is easy to cut budgets on an expensive picture by red-pencil the boat sequences. If I can show a director how to save money shooting a scene, he'll want to work with me next time."

Roberts' boats are used both inside the Hollywood studios

About \$100,000 worth of boats, engines, rigging and other nautical equipment is stored in Roberts' three-story boathouse. Below, warheads for native canoes are spruced up with a new coat of paint





Paramount Pictures photo

For the picture "Saigon" Roberts furnished small native canoes, lanterns, life preservers and coiled rope

and on outdoor locations. Where only a close-up of the actors or the boats is required, shots are taken in studio "tanks" (small, artificial ponds) or "process shots" (against a screen that depicts an open sea, a roaring river or a South Sea dock). But where more of the background is required, Roberts' boats may be trucked to an appropriate outdoor setting. His craft have been shipped as far away as Maine, Canada, Louisiana and Mexico.

Roberts' biggest picture was "Captains Courageous," but his toughest was "Mrs. Miniver."

When the Grand Banks scene in "Captains Courageous," starring Spencer Tracy, was shot off Huntington Beach in southern California, it was a three-week job. Roberts rounded up 100 dories and 14 yachts, repainted or covered the superstructures with black paper so they would resemble fishing schooners.

"Much of that picture was shot on location," he says. "The expense of the rented yachts was terrific. We began shooting early in the morning and continued until late at night. Early one morning a blow came up and all 100 dories broke loose and were scattered along the southern California coast. That's one reason boat scenes are expensive!"

Here's what made "Mrs. Miniver" the toughest picture: M-G-M telephoned one afternoon at 4:00 p.m. and requested Roberts to have 50 boats at the Culver City studio by 6:00 a.m. the next morning. This was during the war, when transportation and gasoline were severely rationed.

Bets were wagered at the studios that

"this was one job Roberts couldn't pull off." But he is a resourceful individual with many friends. The boats were on the set at the appointed time and the shooting went off on schedule. In the script it was only a four-line scene, but it's the one that most people remember from that picture—the evacuation of Dunkirk. Roberts staged it for \$56 under his \$13,000 budget.

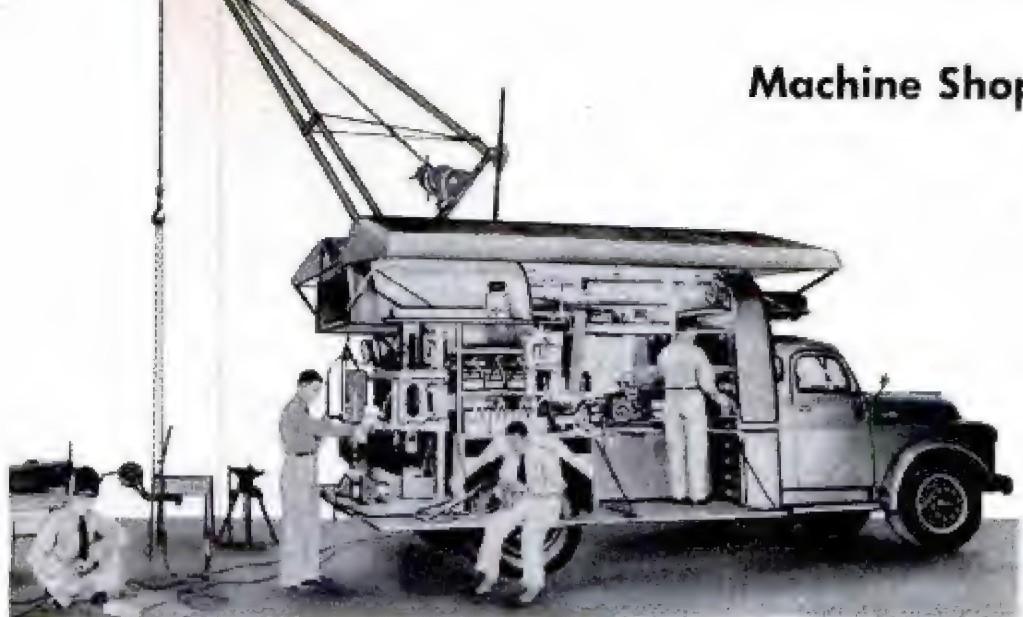
A good measure of Roberts' success is due to the fact that he can convert his 60 boats into several thousand different types by altering the sails, changing types of

(Continued to page 254)

Roberts, leaning over the bow, helps M-G-M cameraman rig camera for a low-angle shot just above water



Machine Shop Unfolds From Truck



Equipped with all major machine and welding tools, a shop mounted on a truck body can cover on-the-job repairs over a large territory. Sides and catwalks fold out from the welded steel body to give protection to the crew in any kind of weather. A drill press, vise and electric grinder are located at the rear. Welding equipment, a lathe, an arbor-press frame and a 50-ton hydraulic jack are built into the truck. Above the shop is a swinging crane with a one-ton hoist. Optional equipment includes a carpenter's kit, blacksmith tools with a forge and anvil, and general shop tools. City electric lines can supply the power or it can be obtained from the truck engine through a power take-off. The engine also provides d.c. for welding.



Top, left, swinging crane with a one-ton hoist can be raised above the mobile shop to handle heavy equipment. Top, workman can stand on catwalk, protected from sun and rain by raised sides. Above, shop folds into a fast-moving truck between jobs



"Odorproof" Glass Cage Tests Sense of Smell

Smells are studied scientifically in a "smellproof" glass cage at Cornell University. The cage is used in research aimed at uncovering the mysteries of the human olfactory system. The subject must bathe in a detergent, deodorize his nose and throat passages and put on an impervious, Fiberglas suit before being tested. He breathes isolated odors from a glass vial and exhales through a glass tube which pipes his breath into testing instruments. The research is expected to have immediate practical application in the air-conditioning field.

American fur trappers and fur farmers produce about 30 million pelts a year, of which about 5 million are obtained from animals raised in captivity.



WHEN HIS SHIRTS wear out, Harrison Elliott doesn't discard them—to him they have a worthwhile future as raw material for his handmade paper. The New York hobbyist has a papermaking workshop in his home where he produces a variety of beautiful paper that is prized by collectors. Although he prefers to use new cotton and linen fabrics, Elliott has produced excel-

lent paper of unusual textures and colors from his castoff shirts and other garments. Since he is connected with the paper business professionally, his hobby is a sort of postman's holiday to him. However, as shown on the following pages, Elliott likes nothing better than to spend an evening in his home workshop producing fine papers of his own design and manufacture.



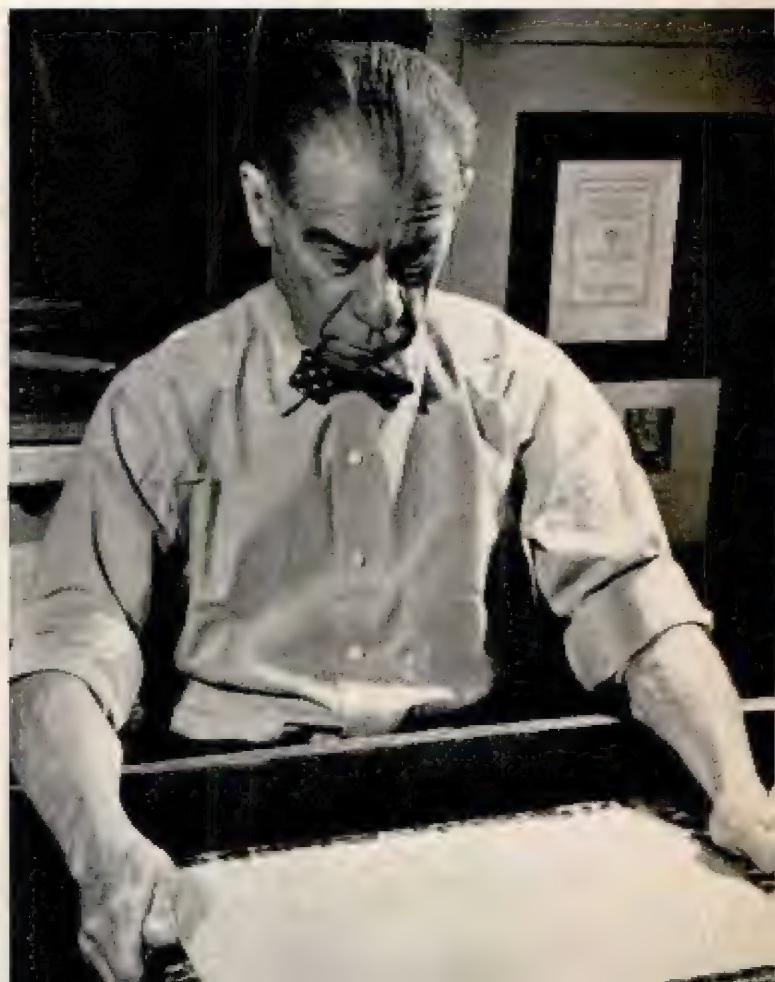
Elliott starts the process of converting a castoff shirt into fine paper by cutting the garment into many small pieces. The sharp blade of this cutter speeds the task. The buttons were removed earlier



Rags are placed in this tub where the motor-driven beater converts them into a fibrous mass. It takes several hours to complete the process. Elliott is examining the pulp which is still in threaded state

Beater roll with cover removed to show stainless-steel blades, which revolve against the corrugated bedplate, pounding the pieces of cloth into a pulp

Thoroughly beaten, the pulp is placed in a vat and stirred. Then this mold is lowered into the mixture and lifted out, covered with a thick sheet of pulp





Elliott inspects the watermark design on the screen of a hand mold. The design is formed with fine wire
When pulp is removed from mold it looks like this.
Design of the watermark shows up clearly in photo

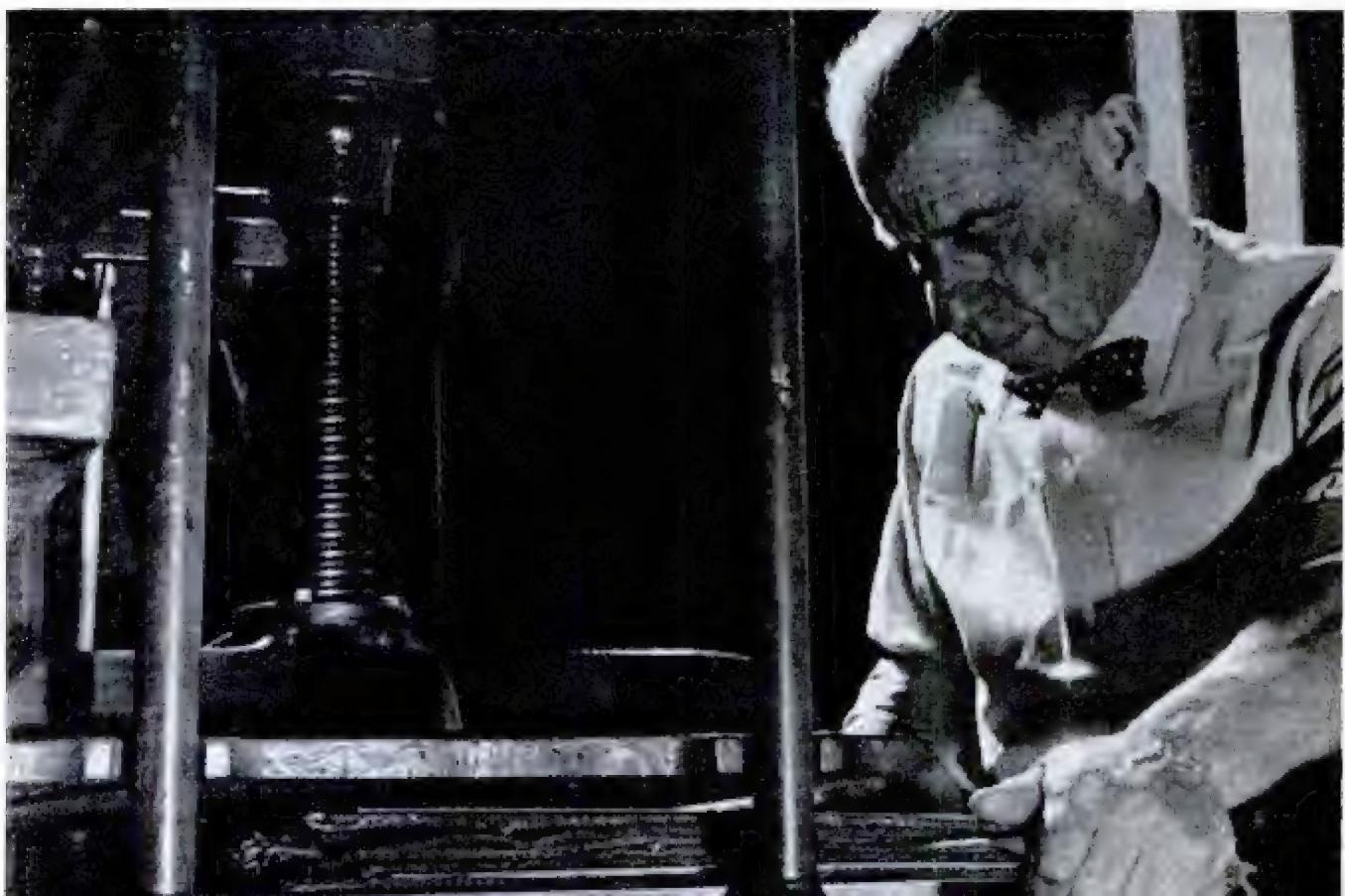
This step, known as couching, consists of tipping the mold upside down, depositing the pulp on felt

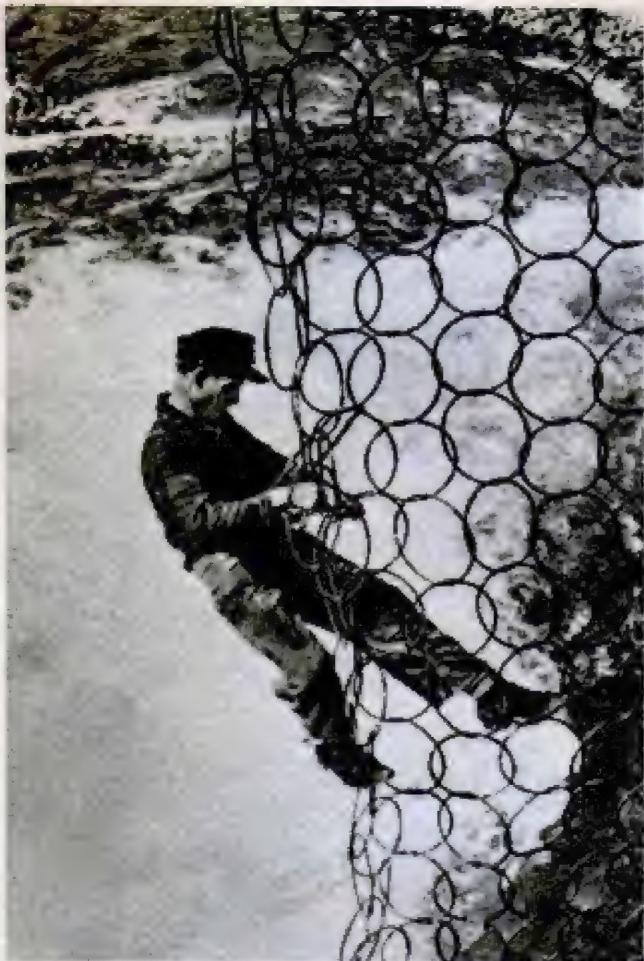




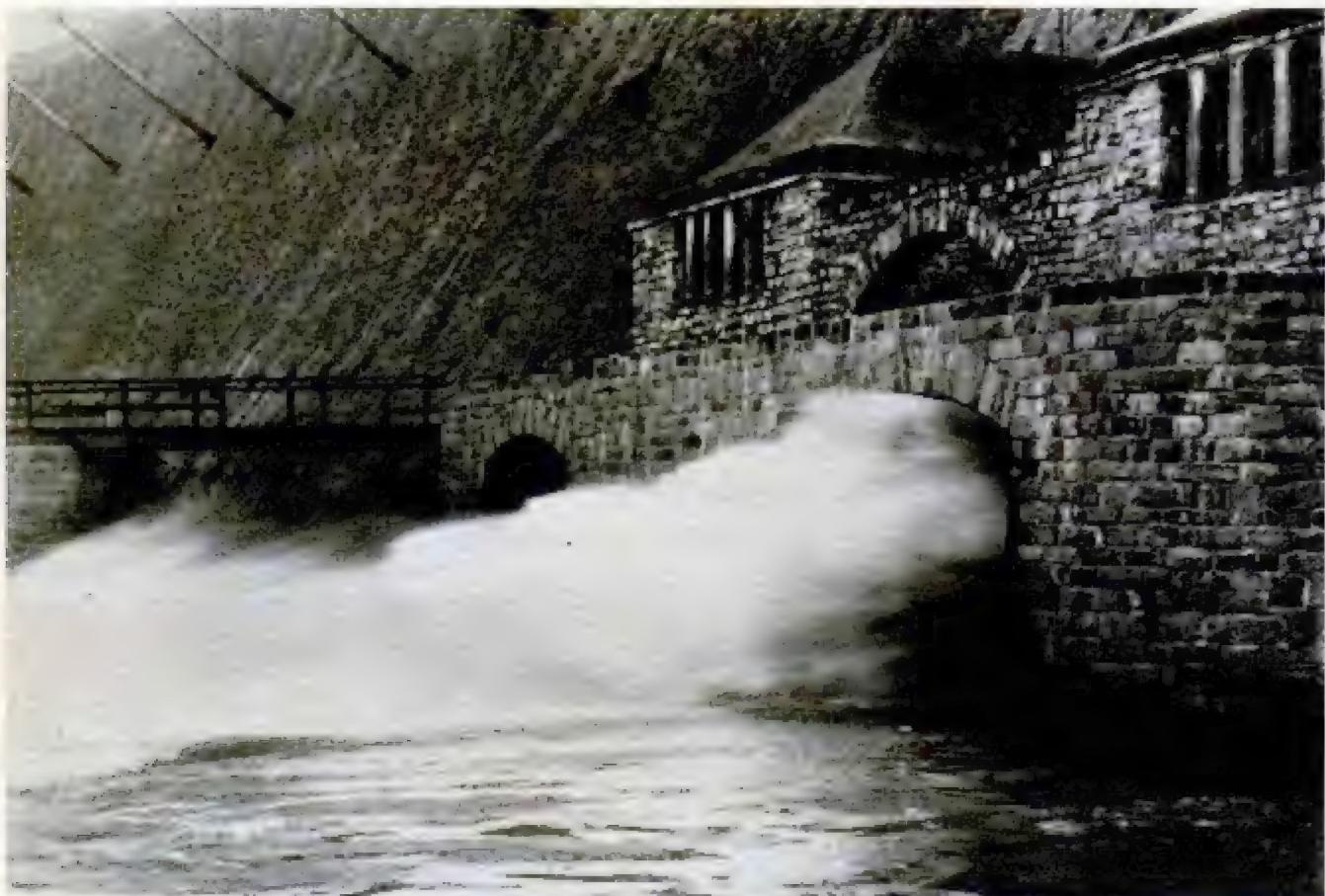
Elliott produces many unusual papers. To make this sheet, he embedded leaves in the pulp during molding

After pulp sheets have been couched, they are placed under a hand press to remove moisture. Press is also used when the paper sheets, after sizing and drying, are squeezed between metal to produce smooth finish





TAKING DOWN THE SCREENS is a risky operation when there are 250 tons of them suspended high above a roaring river. But to a former German parachutist who has the job, it is just a way to earn a living. The heavy screen, consisting of large steel rings linked together, was stretched along the top of a big dam in Westphalia, Germany, to protect the hydroelectric installation from destruction by Allied bombs. When bombs fell into the screen, they would explode before striking the retaining wall. Because of the steel shortage in Germany, the 250 tons of screen had to be dismantled. The former soldier doesn't seem to mind his unenviable task of scaling the nets and attaching draglines with which the screens are pulled down



Picnic Lunch Box Serves as a Table

Picnickers can carry their own table with them in the form of a handsome carrying case that opens to form a sturdy table on which to serve the lunch. Packed for travel, the case holds two large vacuum bottles, eight plastic cups and two metal sandwich boxes. Four hinged legs for supporting the table fold inside the case, which is covered with a durable canvas duck.



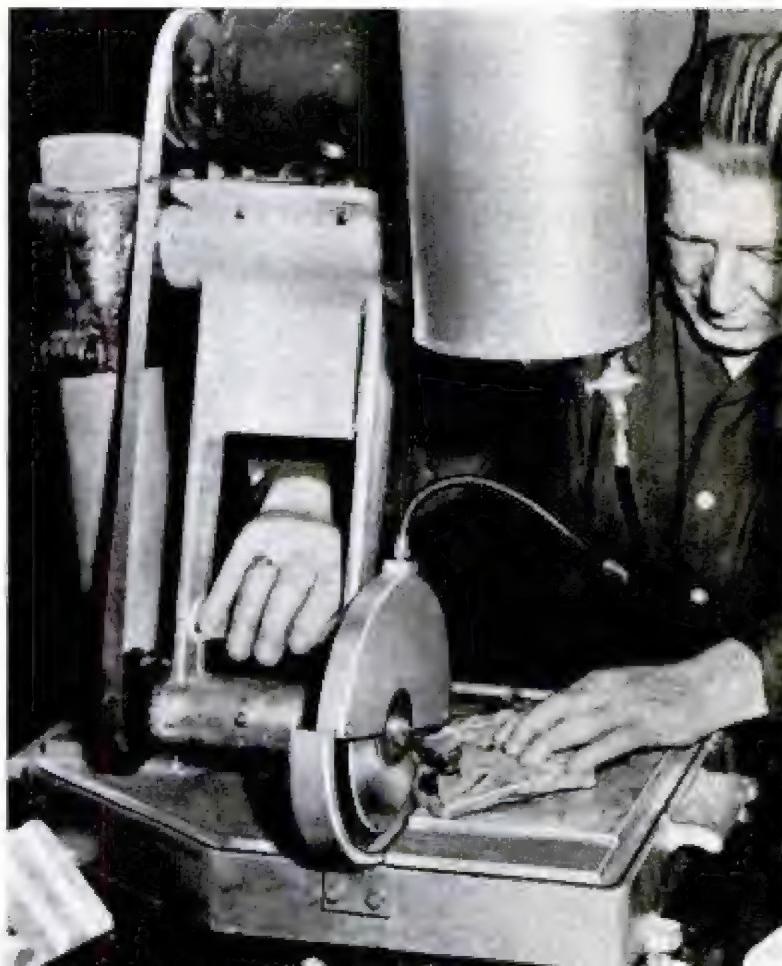
River "Paddle Boat"

Paddling 45 miles a day along the river is not hard work for John Stemle of Jasper, Ind. He does it frequently in a single-seated paddle boat he built for less than \$60. The paddle wheels, each two feet in diameter, are made of welding rods and fitted with small blades. Fenders keep the water from splashing into the canvas-covered craft. He cranks the paddle wheels by hand with an old bicycle frame mounted upside down in the cockpit.

Portable Saw Cuts Tile

All types of ceramic tile may be cut on the job with a portable tile-cutting machine that employs a high-speed diamond-faced saw with a peripheral speed of 7000 feet per minute. The motor and saw are on an overhead swing-type mount that facilitates control. All moving parts are above the work and chips and dust are washed away by the stream of water that serves as coolant for the saw blade. Jigs for holding various odd shapes of tile are provided and the machine may be adjusted for any desired cutting angle. The tile cutter weighs 80 pounds and may be used for cutting cemented pieces, optical glass and similar refractories.

Instruments capable of measuring deflections as small as $1/1,000,000$ inch are used by engineers in testing concrete pavements.



Hen Tracks on Sound

Artist in sound uses only brush, pen and ink, spacing the dabs and marks by a guide chart under the film



He converts music into photographic terms. The white lines fanned out on black cards make a musical scale



WITH ONLY a strip of celluloid and a brush, Norman McLaren can create jazz music, the sound of a galloping horse, a burp or any other strange noise. McLaren is the one-man producer of the National Film Board at Ottawa, Canada's capitol.

As McLaren puts it, he "makes hen tracks on sound tracks" or draws his sounds directly on movie film. The usual procedure in making a sound track is to pick up the sound through a microphone, then convert it into light and dark areas along the edge of the film. When run through a projector, this optical track is reconverted into sound through an amplifying system.

McLaren's method short circuits all these stages. All he does is make little black dabs with a pen or brush on the film. But they aren't just random dabs of ink—they must follow a special pattern and fit into a space less than $\frac{1}{4}$ inch wide. If the sounds are to be loud he draws them with heavy strokes; if he wants them softer he reduces their size. All the dabs and wiggles must follow a mathematically precise pattern. To produce middle C, for example, he must make about 11 dabs for each picture along the film.

He also is experimenting with sound drawn on cardboard and later photo-

graphed on the edge of the film. In this method, the wave forms can be drawn as large as desired and reduced to the proper width when photographed. This makes it possible to build up complex sound patterns, thereby giving greater flexibility to hand-drawn sounds.

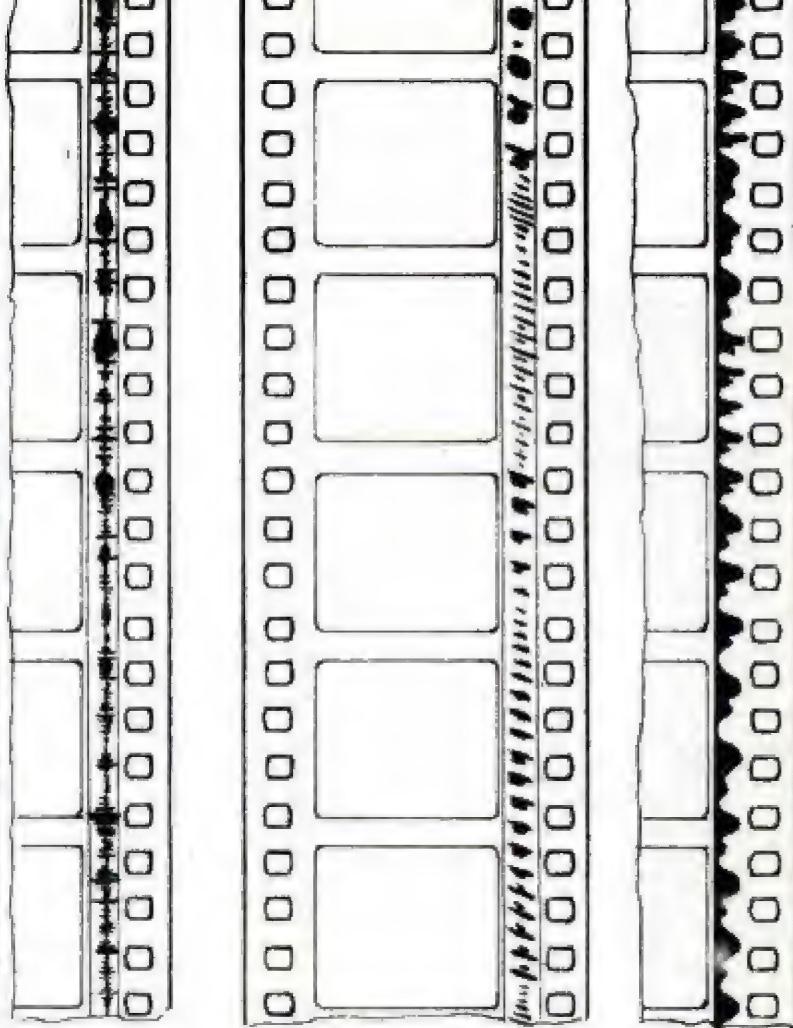
When he is making a musical track, he translates each musical note into photographic jargon on what he calls a "dope-sheet." The pitch, value, time and strength of the notes are converted into a table of technical terms.

McLaren's sound tracks are used with movie cartoons and other short subjects with such good results that the sound often steals attention from the picture itself. One film is a Baron Munchausen fantasy which depicts an upside-down world with upside-down sound. The hand-drawn sound is crammed on the film with fantastic results. Among his other numbers are a Bach rendition that sounds as if it were played on a buzz saw and "Pop Goes the Weasel" on an electric organ.

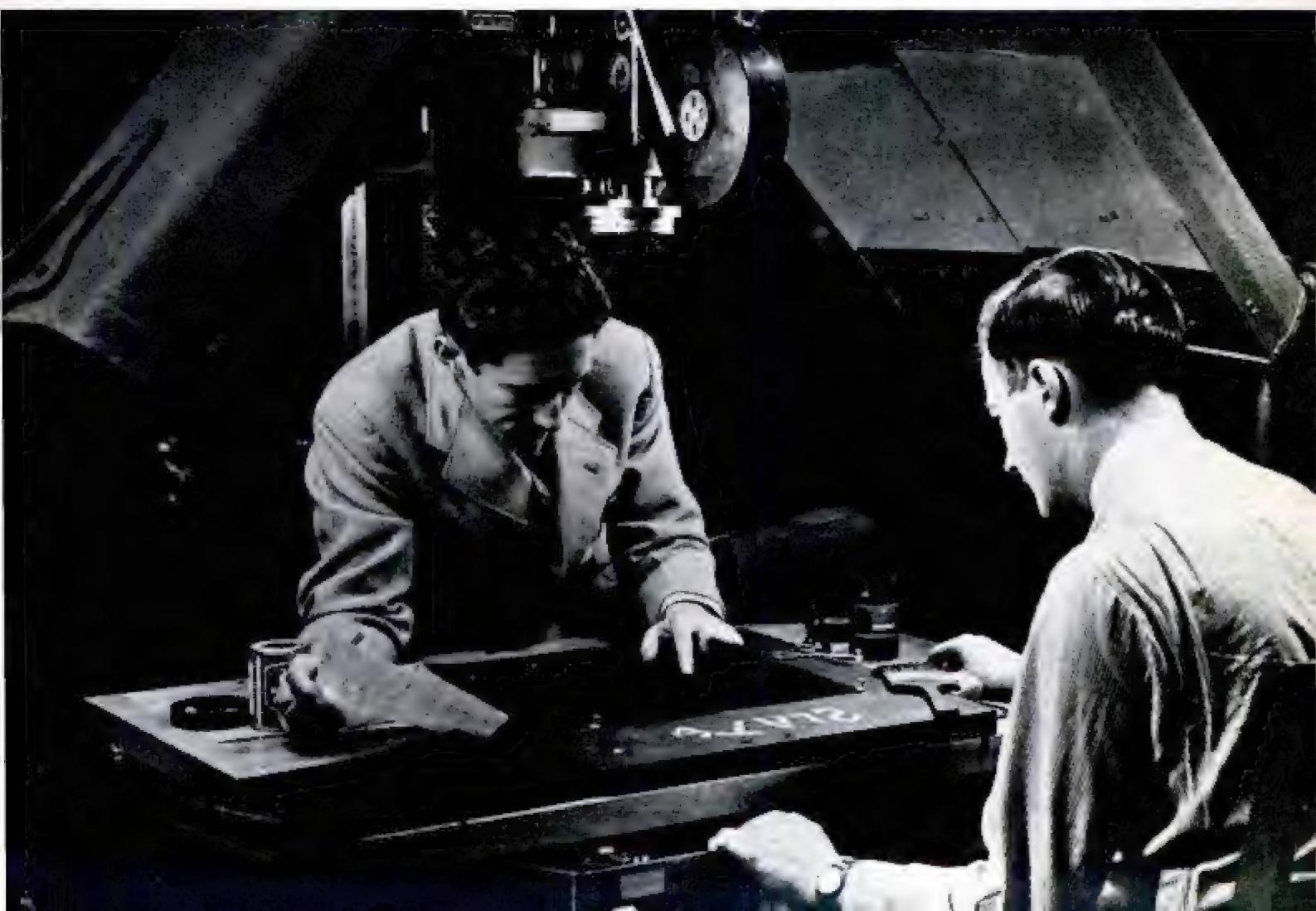
The artist's idea is not to copy existing sounds but to make new sounds which can't be obtained in any other way. Most of his sound tracks are, as he puts it, "a symphony of burps and rude noises" which produce hilarious results.

Tracks

McLaren paints a scale on card. Each wavy strip is a different note but has the same tonal quality



↑ Left strip is conventional track, other two are hand-drawn. Below, animation camera shoots sound on a card

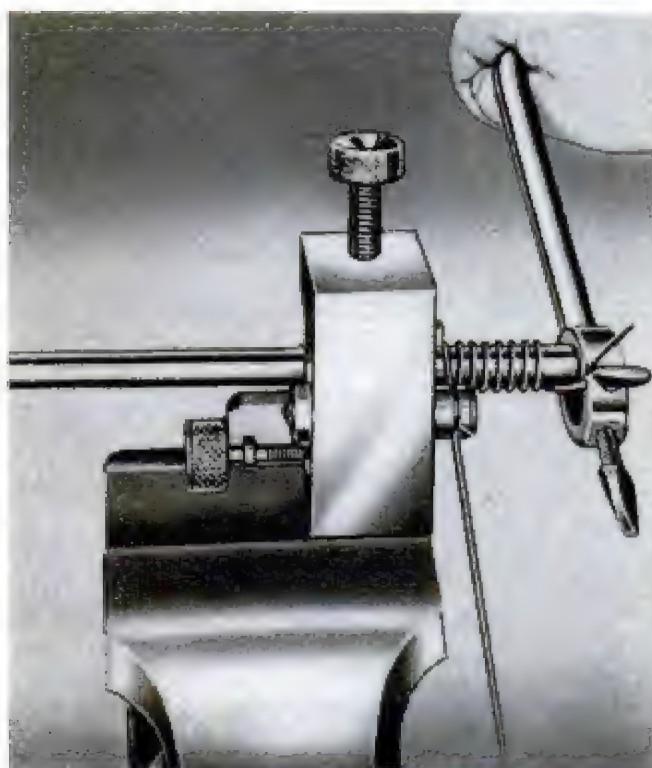




Self-Righting Life Jacket

Unconscious victims of sea disasters can't float face down in the water when they wear a self-righting life jacket developed in England. A gas cylinder inflates

the jacket and the air pocket supports the wearer face up on the surface. The jacket can be slipped on and inflated in less than 10 seconds. A canvas handle on top of the jacket permits rescuers to lift an unconscious survivor from the water.



Spring Winder

Springs of any size up to one inch can be turned out with a winder that is held in a vise. The winder, which can be operated by an inexperienced worker, uses wire up to $\frac{1}{8}$ inch in diameter, and winds springs to any length and pitch. Turning a crank winds the spring to the desired size. The winder is part of a kit which also includes five mandrels and six coils of spring wire in various diameters.

Air Vent for Hot-Water Heating

Venting air from hot-water heating systems is completely automatic with a new valve that requires none of the preliminary soaking needed with previous types. It can be used on both forced-circulation and gravity-circulation systems, either new or existing. A selector screw, easily adjusted, provides an automatic air eliminator, manual shutoff or manual venting.



Radio on Farm Tractor Is Shockproof

Farmers can now hear their favorite news broadcasts, weather reports and other radio programs as they operate their tractors in the field. Designed especially for mounting on farm tractors, the new radio is waterproof and shockproof. It has six tubes and a telescoping antenna.



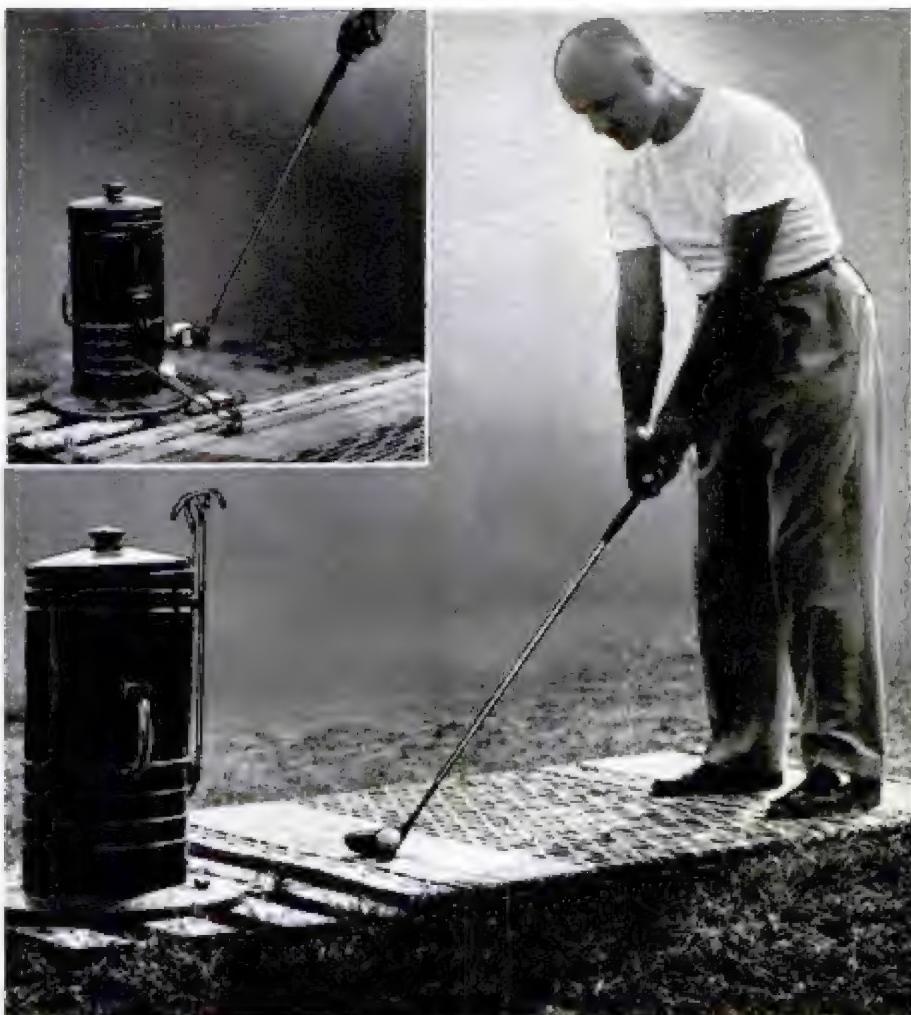
Garage Lift-Post Jack Rolls to Job

Two small wheels on the base permit a new lift-post jack to be wheeled to the proper position. Designed for garages, the jack has a short handle so that it can be used in confined places. It lifts at the bumper or bumper bracket and can be manipulated from a standing position. When a car has been lifted, the complete wheel is exposed to permit quick changing of tires, inspecting brakes or packing wheel bearings.

Feeder Tees Balls For Golf Practice

Golf balls are automatically teed up for practice shots by a machine installed on practice driving ranges. The golfer deposits his bucket of balls in a cylindrical container. Each time he presses a lever with his golf club, a ball rolls down a wire track and comes to rest on a rubber tee. When the lever is released, the track springs up, away from the ball.

Inset shows how ball rolls down track to the tee



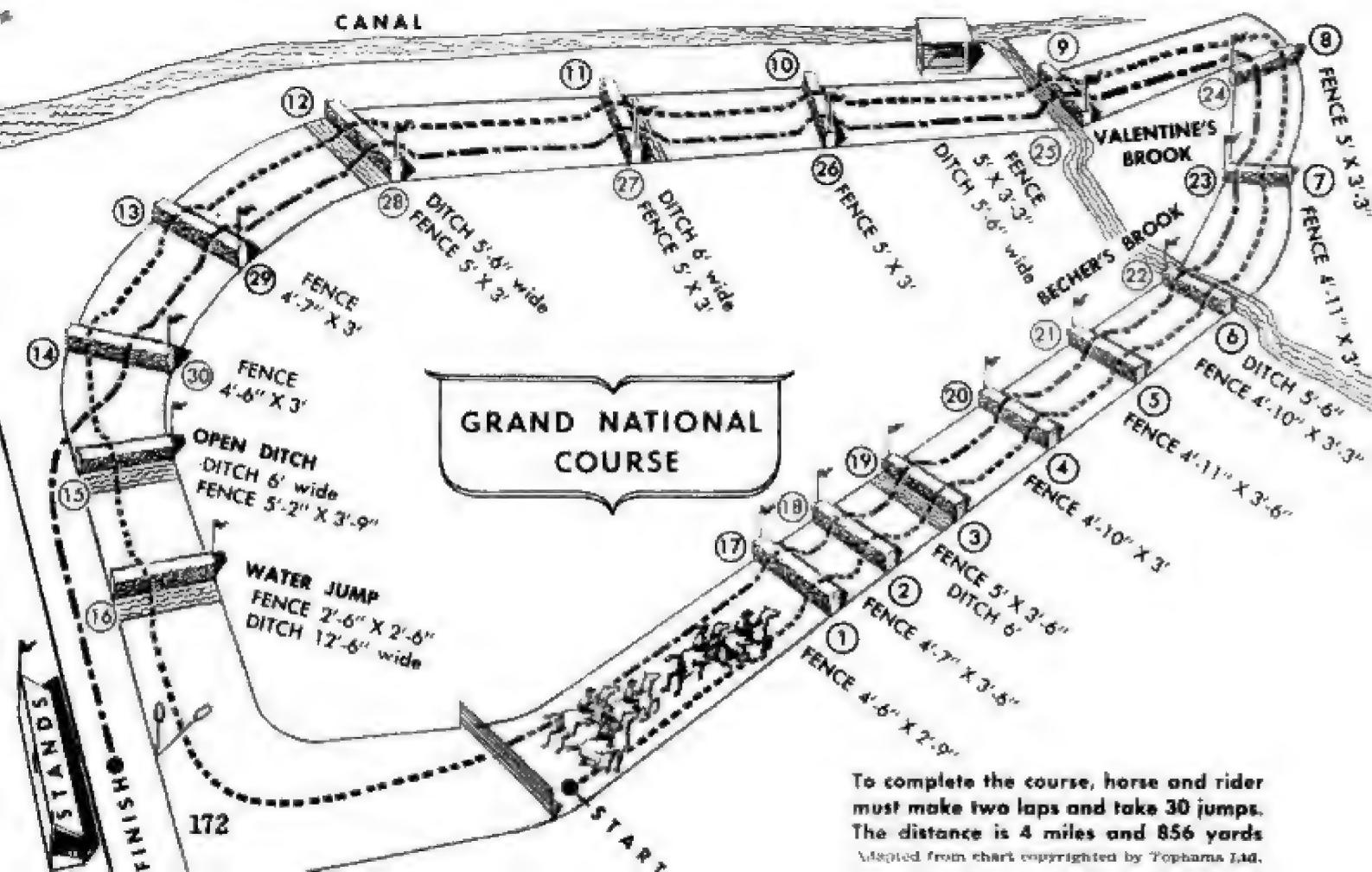
For information concerning sources of supply for commercial products described in this issue, turn to the WHERE-TO-BUY-IT INDEX (page 8), listing manufacturers' names and addresses

Slow horses have won at Aintree, but none without greatness of heart and endurance can meet the challenge of the fences and brooks that have tested the Grand National winners since 1837

A field of jumpers clears Becher's Brook which has taken a heavy toll of Aintree aspirants in the Grand National Steeplechase race



Steeplechase Supreme



To complete the course, horse and rider must make two laps and take 30 jumps. The distance is 4 miles and 856 yards.

Reprinted from chart copyrighted by Topophana Ltd.



Crowd gathers along rail at deadly Becher's Brook. Horses must clear brook 5½ feet wide beneath fence

SPILLS AND THRILLS by the thousand have lured steeplechase fans from all over the world to the Grand National Steeplechase Course at Aintree, England. Owners of stout-hearted jumpers have traveled halfway around the globe with their entries in the slim hope they had a winner. One New Zealand horse, Moifaa, actually swam part way to England to enter and win the race. The ship on which Moifaa was being transported was wrecked off the coast and he swam ashore. That was back in 1904.

Moifaa was said to be one of the ugliest and ungainliest of horses ever to win the race. Beauty doesn't count at Aintree when the chips are down and the fences and water jumps on the second lap seem to get taller and wider. That is when horse and rider, plagued by fatigue and riderless mounts, must call upon hidden sources of endurance and courage. Some Aintree winners like Golden Miller have been real beauties and models of grace as they took the

jumps, but many have been plodders. What every Grand National winner has had to have is the heart of a champion.

Twice around this grueling course equals 4 miles and 856 yards. There are 16 jumps on the triangular course and all except two are taken twice. The most famous of the jumps—which trainers and owners of steeplechase entries mention only in whispers—are Becher's Brook, Valentine's Brook and Canal Turn (No. 8 on the map on the opposite page).

Another thrilling moment at Becher's Brook as a favorite takes the jump





There are plenty of spills and broken bones at Aintree. On second lap, riderless horses add to the hazards

Aintree, a suburb of Liverpool Port in Lancashire, has seen this race run every year since 1839 except for three years in World War I and five years in World War II. The Grand National really started in 1837 over a course at Maghull but it was not until 1843 that the race was handicapped. From four starters in the first race — an all-time low — to a record of 57 in 1947, the Grand National has shown a preponderance of British winners. However, Battleship, an American horse and the son of Man o' War, won in 1938 in 9 minutes 29½ seconds. That was within the six fastest times ever recorded for the course. Golden Miller made the fastest time in 1934, finishing in 9 minutes 20½ seconds, carrying a rider who weighed 170 pounds.

The race is run in March each year, getting off amid great excitement to a straight 471 yards to the first fence. This is made of

close-packed gorse to a height of 4 feet 6 inches and is 2 feet 9 inches thick. A second similar fence an inch higher and 9 inches thicker follows. Then comes a fence of spruce 5 feet high and 3 feet 6 inches wide with a 6-foot ditch on the take-off side 2 feet 6 inches deep with a guard rail 1 foot 6 inches high in front of the ditch.

These jumps and the three succeeding are on the long straight course to Becher's Brook. Here many a man has seen his chance of winning vanish with his stake money. Becher's is made of fir to a height of 4 feet 10 inches and is 3 feet 3 inches wide. It looks innocent enough until half-way over. Then the jockey sees a ribbon of water on the far side stretching 5 feet 6 inches farther on. This is a natural brook running into a nearby canal.

There are more legends centered around Becher's Brook than any other part of

The Water Jump is 15 feet over-all. Among these entries finishing first lap are two horses without riders





An American entry (with 100-to-1 odds) clears Aintree hurdle

the course. Steeplechase followers like to tell about the great horse, Sprig, who cleared not only the fence and brook but also two fallen horses. This carried Sprig to victory and racing immortality in 1927. Sprig had competed twice before in the race as is often the case with winners.

Once over Becher's, the course bears left over another fir fence to Canal Turn at which a spruce fence 5 feet by 3 feet 3 inches leads immediately to another acute turn to the left. This brings the field to Valentine's Brook, actually a second crossing of Becher's near its junction with the canal. Although it is two inches higher than Becher's, it cannot claim as many victims.

Tired horses on second lap are shown taking Becher's Brook. Sometimes only a few horses finish the race

It was at Valentine's Brook that fiery Easter Hero, known as "the greatest horse that never won the Grand National," met his doom. The cheers of the crowd followed this magnificent horse as he led from the very start of the race in 1929. But after he cleared Valentine's it was apparent that something had gone wrong. Later, in the paddock, after Gregalach had won, it was discovered that Easter Hero had spread one of his light racing shoes and could hardly walk. This horse was owned by an American, Jock Whitney.

After Valentine's comes a succession of easier jumps until the rider comes to Open Ditch. This has a fence of spruce prefaced by a 6-foot ditch that is banked by an 18-inch guard rail. The next one, Water Jump, which is 15 feet wide over-all with a thorn fence of spruce, ends the first lap. The second lap omits Open Ditch and Water Jump. Dodging around Open Ditch, the final stretch of 494 yards leads past the grandstand and tests the tired horses to find a winner.

During the 112-year history of the Grand National only 11 mares have been winners and only two four-year-olds. The three leaders are usually in the seven-year-old class. Since 1900 some 30 of the winners have been bred in Ireland, which leads envious trainers to remark that these horses have "the luck of the Irish" with them. This was true in 1928 when Tipperary Tim, who wasn't considered to be in the running, splashed through mud and rain to win. Only one other horse, Billy Barton, finished that day.

The key to success at Aintree seems to be good muscles, a fighting heart and a bit of Irish luck.





Hobbyist Carves Monkeys From Peach Stones

Using only a pocketknife for a tool, Captain Adrien Joly of a police and fire station in St. Jerome, Que., Can., carves monkeys from peach stones. The figures follow outline of the stones and show the monkey curled up, complete with eyes, ears, hands, feet and ribs. Each figure requires about 36 hours to carve. The craftsman then fashions them into necklaces.

Plane Pitches First Ball

Japanese high-school baseball teams started play in a tournament at Osaka with a ball dropped to the pitcher's mound from an American reconnaissance plane. It was then thrown by an American officer to a schoolboy catcher to formally open the competition. Donated by the American League of Professional Baseball Clubs, the ball had streamers attached for the drop.

Courtesy of The Osaka Asahi



Deposit Box Has Combination Lock

Complete privacy for your important papers is assured when you place them in an all-metal box that opens only when its five rotary locks are turned to the proper combination. Each of the locks is controlled by a plastic dial mounted along the front edge of the fire-resistant box. Small enough to be packed in your suitcase, the box keeps confidential papers and other valuables secure while you are traveling.

Twin-Light Floodlight Unit

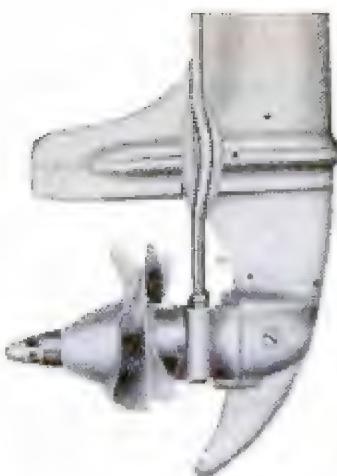
Using two photoflood lamps in a pair of 11-inch reflectors mounted on the ends of a bracket, a lighting unit for either movie or still cameras assures adequate illumination on moving subjects. As the photographer follows the subject with the camera, the lights do likewise. Light in weight, the unit has a convenient on-off switch just below the camera. It can be used with or without a tripod and it folds compactly for packing in a small carrying case.



Variable-Pitch Prop Backs Up Boat

With a variable-pitch propeller for outboard motors the boatman can maneuver his craft in reverse, idle the motor in neutral or go forward at three different speeds. The propeller unit can be installed with a wrench and screwdriver. The controls are fastened directly under the gas tank.

All external parts of the propeller are made of aluminum alloy, with the bushings and drive shaft of stainless steel. If



the control lever or rod is damaged accidentally, the propeller automatically moves into a forward driving position.

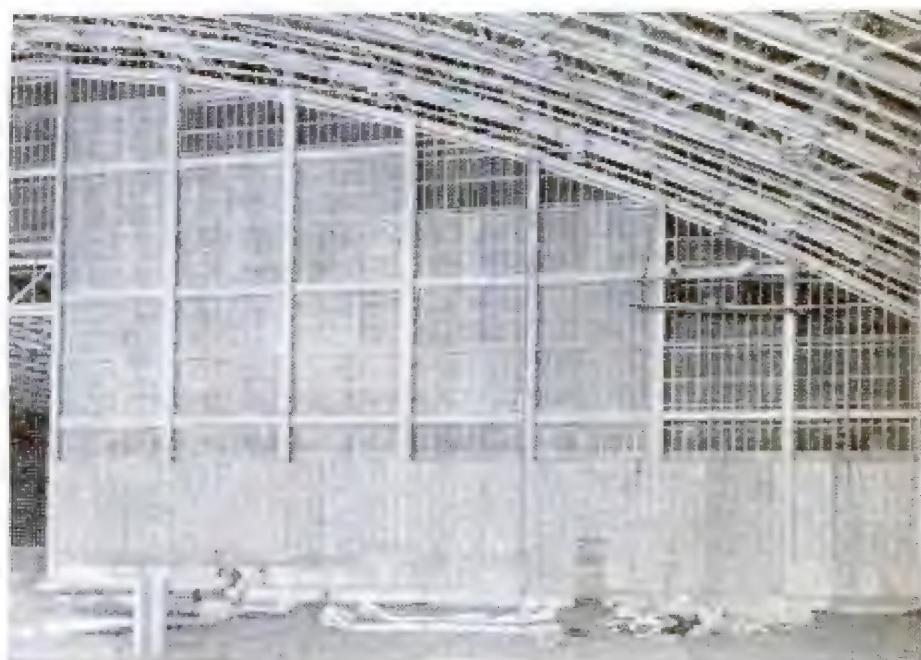


Official U. S. Navy photos

Mesh-Wire "Cocoon" Shields Radar

Fine mesh wire covers the entire inside of the Navy's \$2,000,000 test hangar nearing completion at Patuxent River, Md. The fine wire screens out all electronic disturbances. The hangar will house the equipment for tests on radar and other electronic devices in aircraft. One of the largest shielded buildings ever constructed, it is 300 feet wide, 178 feet long and more than 67 feet high. A bay, 79 feet long and 35 feet high, will accommodate the nose of larger-type planes. Two layers of wire mesh have been laid in the concrete floor and bronze spring contacts join the shield at the door openings. Four miles of soldering were required

Fine mesh wire completely lining the interior will shield experiments within the Navy Air Test Center hangar from all electronic disturbances



to bond all the joints in the covering. Mesh was used because it is cheaper and permits ventilation and light.

SMOG SLEUTHS



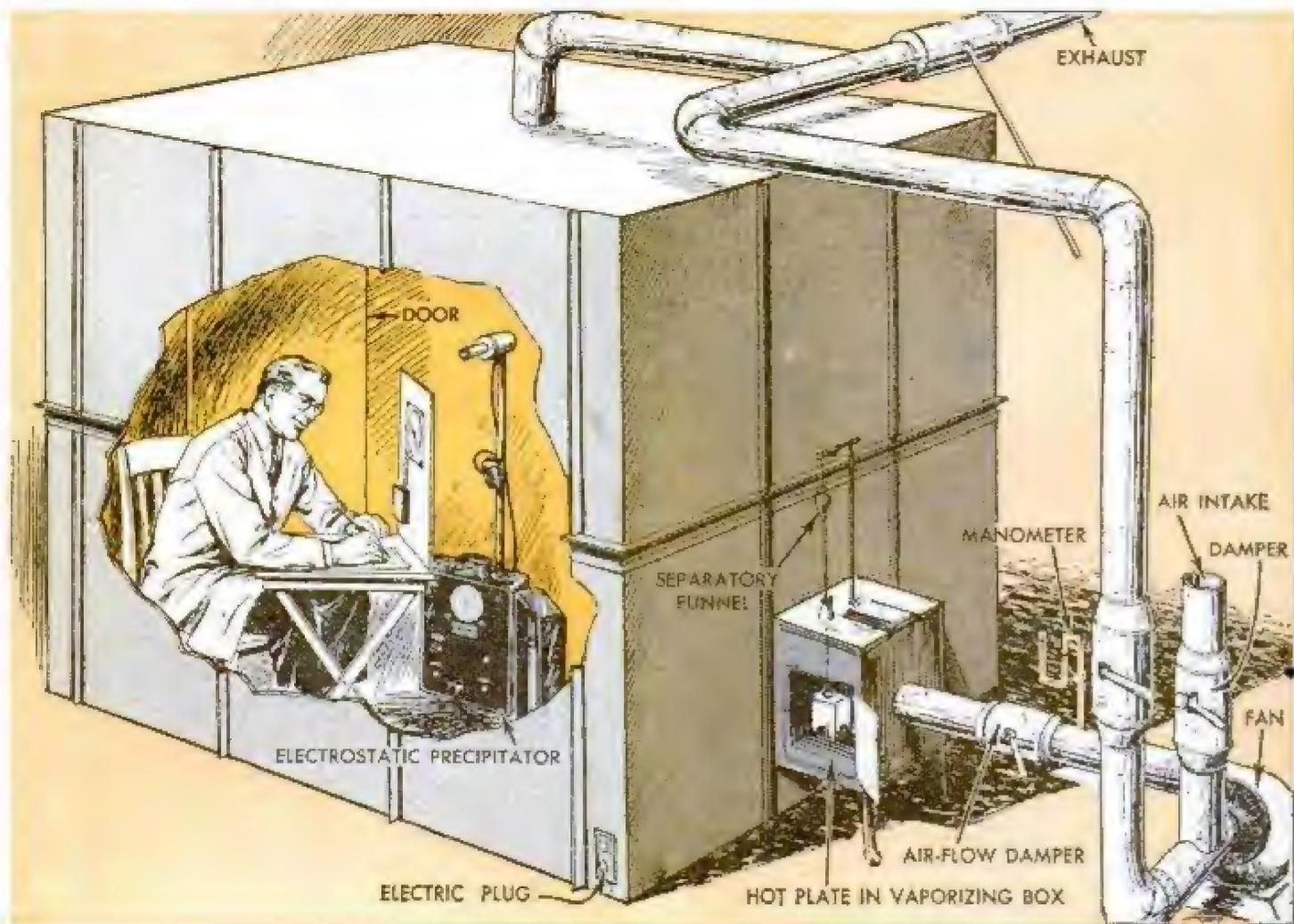
Above, attendant inspects box which generates test vapors that are blown into the smog chamber, below

EVERY DAY millions of tons of potentially deadly contaminants are poured into the air above our big cities and industrial areas. These lethal fumes are ordinarily carried off by the wind and harmlessly dissipated, but sometimes certain weather conditions combine to prevent their escape. The fumes may then descend in a poisonous cloud, causing acute discomfort and, in extreme cases, death. This is what happened at Donora, Pa., in October 1948, when a choking smog filled the narrow valley where the town is located, bringing death to 19 persons.

Smog has been hanging over industrial cities for years, but still nobody can say exactly what it is. Its name is a combination of the words "smoke" and "fog," but it is not that simple. There are as many theories about smog and what causes it as there are people studying the problem, but everyone agrees that something must be done about it, and soon.

Scientists of the Stanford Research Institute at Palo Alto, Calif., are trying to solve the mysteries of the smog which plagues Los Angeles, causing eye and throat irritation and reducing visibility.

Even though smog is visible, compounds which cause eye-smarting may be invisible and the amount of contaminating material





Fairchild Aerial Survey photo

Air view of Los Angeles shows smog layer. Warm air mass above smog prevents it from rising and dispersing

may be less than ten parts in a billion parts of air.

To bring smog into the laboratory where they could try out the suspected irritants on human "guinea pigs" under controlled conditions, the research-institute scientists developed the smog chamber.

It is a galvanized sheet-metal cubicle, big enough to walk around in, mounted on a movable platform so that it can be taken wherever the scientists want to make tests. One wall has an observation window and in the rear wall there is a small vaporization compartment where the smog is created. A blower sends it into the chamber where the subject records his reactions.

Technicians control the flow of smog through the chamber with dampers in the ducts leading into the chamber. Vapors in the chamber are picked up by an exhaust flue in the ceiling and either discharged or recirculated through a return duct.

Counting the blinks the eyes make when exposed to smog is a good way to measure the amount of eye irritation caused by smog. To measure blink rates, the scientists use goggles fitted with photoelectric cells. Smog vapors are fed into the air space between the goggles and the subject's eyes.

The photoelectric cells pick up the light reflected from the whites of the eyeballs and record each time this light is interrupted by a blink. By comparing the person's normal blink rate with his blink rate when the smog is irritating his eyes, researchers measure the effects of various irritants.

Chemical compounds such as sulphur dioxide, sulphur trioxide, formaldehyde, acrolein, oxides of nitrogen, hydrogen persulphide and elemental sulphur, which can cause eye and nose irritation, are being tested one at a time and in combination in the smog chamber.

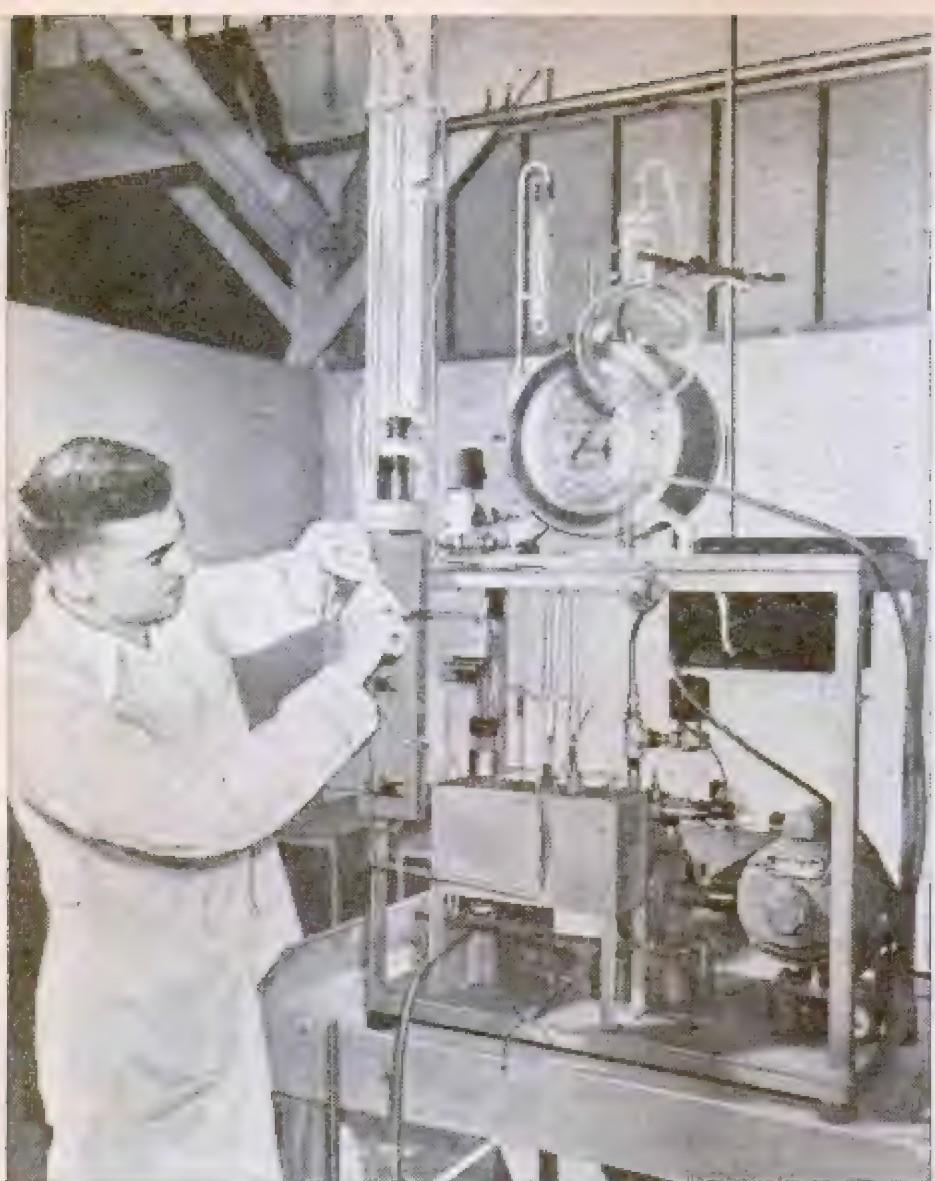
Some of these chemicals already have bad reputations. In 1930, in the Meuse River Valley in Belgium, 68 persons were killed by a smog of industrial fumes which filled the valley. The victims died as a result of inhaling the deadly chemicals borne on minute fog droplets.

Dr. L. Dautrebande, Belgian scientist and authority on smog who did a great deal of research on the Meuse Valley disaster, is coming to the Stanford Research Institute to explore the possibility that the irritants in the Los Angeles smog are being carried by these minute liquid droplets.

Spotting the irritants in the atmosphere calls for special instruments.

"If you squeeze all contaminating gases and moisture out of 200,000 cubic feet of Los Angeles air," explained one of the scientists, "you will have about one third of a barrel of water. In this quantity of water there will be dissolved perhaps twenty drops of contaminants, of which only a very small part may be the irritating or haze-producing materials we are looking for. The actual amount of contaminating material in 200,000 cubic feet of air may be so little that no method now exists to analyze it chemically. New methods must be invented."

An instrument to measure sulphur dioxide in the air looks like a Rube Goldberg invention with its maze of tubes, wires and tanks. It takes samples of the outside air and passes them through a tank



Above, complex apparatus measures tiny amounts of sulphur dioxide in the air. Below, transmissometer in box sends a beam of light into the large smog-filled pipe and measures the visibility loss caused by the vapor



containing a solution of hydrogen peroxide.

If there is any sulphur dioxide in the sample, it is oxidized by the hydrogen peroxide to form sulphuric acid. Electrodes in the tank instantly record any change in the conductivity of the solution caused by the formation of sulphuric acid.

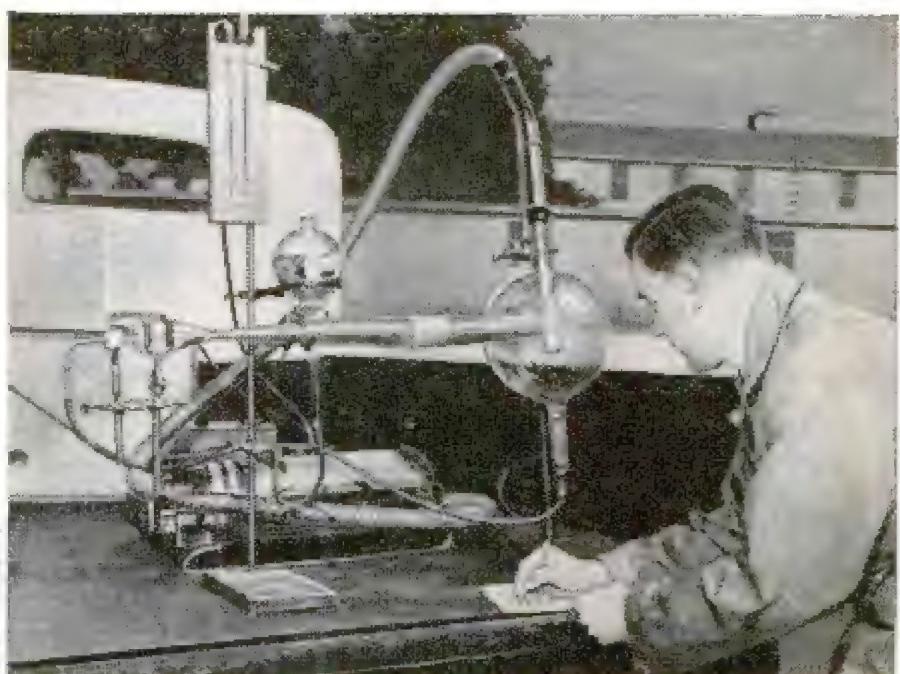
Another ingenious device for studying smog, the Venturi scrubber, uses a vacuum cleaner as its suction pump. Impurities in the air are literally scrubbed out as the outside atmosphere is sucked at a speed of over 200 miles per hour through the narrow neck of a Venturi tube. The high speed of the air as it rushes through the narrow opening of the tube causes it to mix violently with droplets of water being sprayed through the tube. Dust and other particles which are washed out are later removed from the water and tested to determine their nature.

Thousands of dollars are lost every year by airlines

(Continued to page 252)



Above, photoelectric cells measure the blink rate of the eyes as smog is forced inside goggles. Light, reflected by the whites of the eyes, activates cells. Below, Venturi scrubber washes impurities from the air

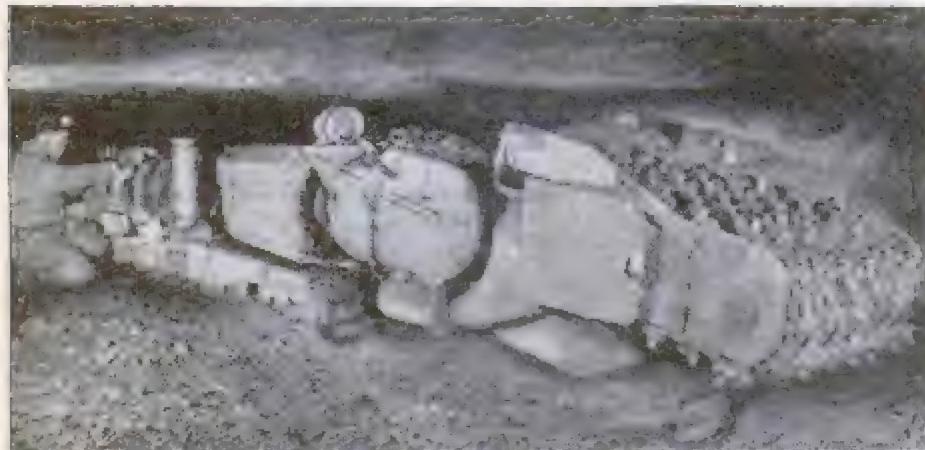


Portable test equipment is used to measure the amount of eye irritants in the air

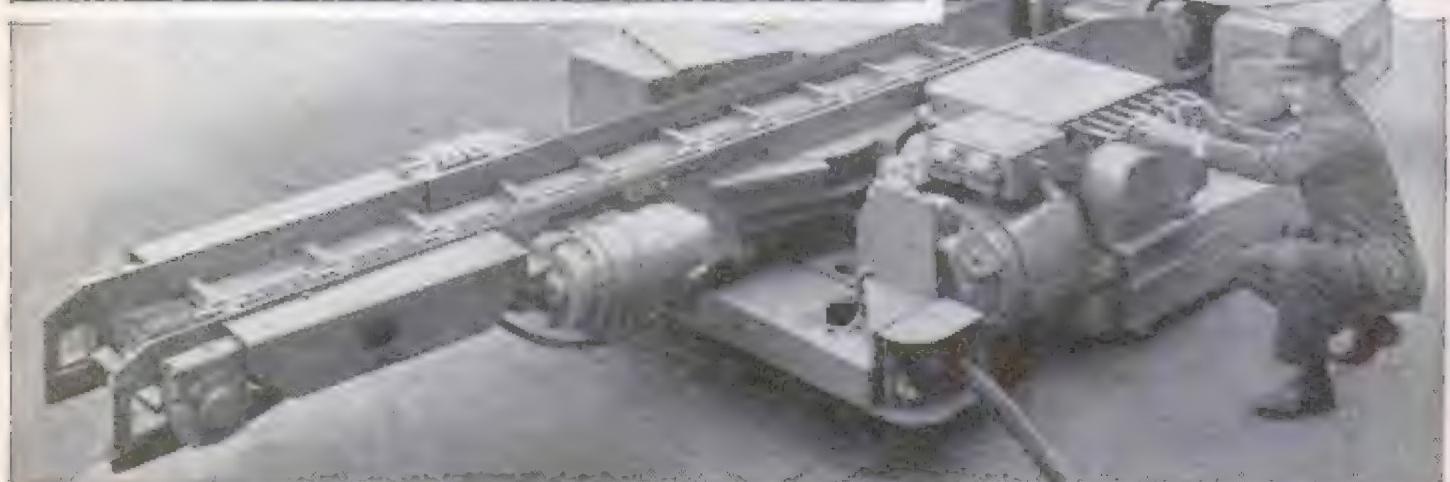
Mechanical Miners



Right, the 26-ton Colmol breaks up the coal with 10 rotating cutters. Below, demonstration of machine shows how coal is conveyed to rear



Below, the Joy Continuous Miner has its control panel about 14 feet behind the nose. Left, the Joy machine in operation underground. Notice its low profile



Cattle Feed From Cordwood

By Patrick G. Kellogg

PART OF THE nourishment in a beefsteak or glass of milk soon may come from a pile of sawdust.

Chemists at the U. S. Forest Products Laboratory, Madison, Wis., have perfected a process for converting wood waste into a molasses that can be used as cattle feed. In tests, beef cattle have fattened as fast with the molasses supplement as with corn, and dairy cows produced just as much milk.

The chemists extract blackstrap molasses from sawdust and other waste by cooking the waste with dilute sulphuric acid under pressure to produce sugar. Then they reduce the sugar to molasses by evaporation and distillation. The process yields 150 to 160 gallons of molasses for each ton of the wood waste.

Molasses can be extracted from almost any type of wood, although the yield depends upon the amount of cellulose available. Various forms of wood from sawdust to cordwood chunks have been used with almost equal success. Waste from turpentine-extraction plants produces almost as much molasses as other types.

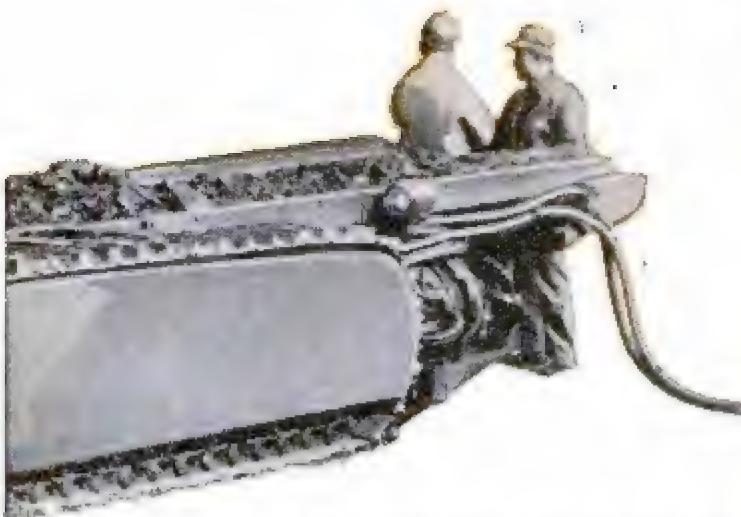
Germany produced alcohol by a similar process during the war. Wood alcohol was essential to Germany's wartime industries and was used extensively as a fuel to power the V-2 jets.

The molasses-makers run cordwood chunks through a "hog" which chews them into slivers or chips. The splinters are blown into a storage bin until they are needed, then poured into a tall tank in batches of 300 to 400 pounds each. In the "digester" tank, the wood is cooked under high-pressure steam with sulphuric acid and water. The acid breaks down the large carbohydrate molecules into small sugar molecules. The solution then is neutralized with lime and filtered.

War-surplus distillation units at the laboratory condense the material, which is further thickened in a vacuum still. Even more purification produces a syrup or sugar that is fit for human consumption.

The process may be a tremendous help in reducing the critical food shortages in the world. Dr. Elwin E. Harris, specialist in charge of the experiments, estimates that wood wasted in finishing the floor of a small home could produce three tons of molasses.

Timberland owners are especially interested in the new process. Even the slashings and trimmings from a farmer's wood lot could be used as a source of molasses. Industrial glucose, now produced by the breakdown or hydrolysis of starch, also can be obtained by using the process.



the seam and convey it into trucks at rates up to 100 tons per man day! Blasting and time-consuming drilling are eliminated.

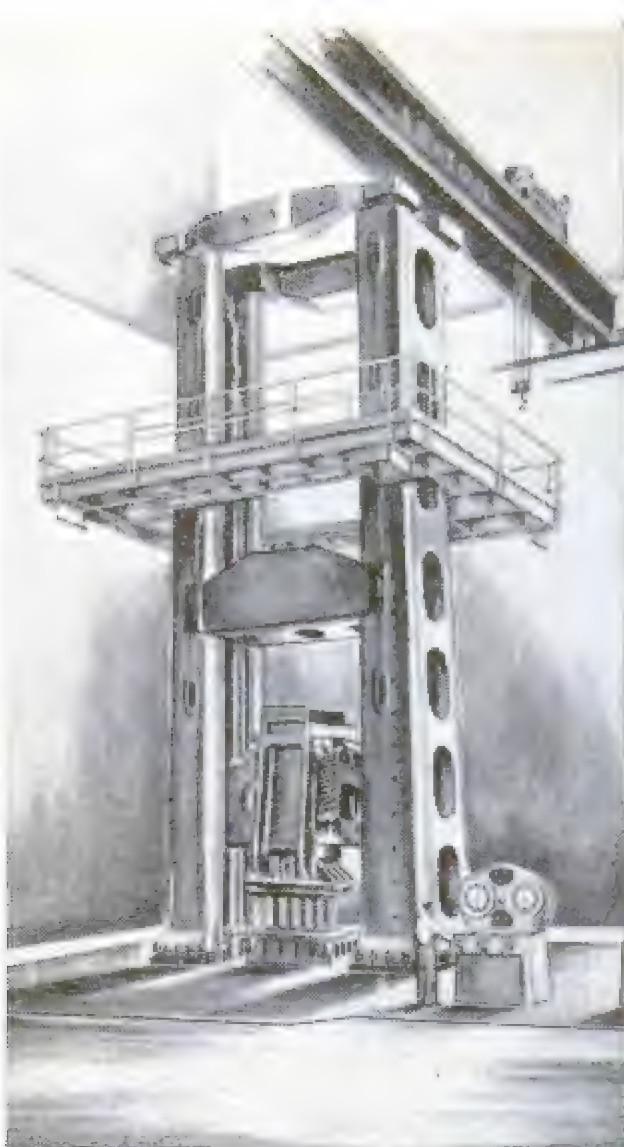
Electrically driven, the machines move under their own power and resemble giant alligators as they "squirm" around obstacles and under low roofs.

The Colmol (pronounced "coal mole") has a rectangular cutting head that burrows into the seam with two rows of five rotating cutters. Teeth on the cutters rip the coal free from a face 9½ feet wide and 4 feet high, advancing 3 feet a minute under good conditions. Rotation of the cutters sweeps the coal onto a conveyor which carries it to the rear where it spills into trucks at a rate of three tons per minute. It takes only one man to run the powerful machine.

The second machine, the Joy Continuous Miner, has a capacity of two tons a minute. Its "snout" is a menacing looking affair with jagged teeth that scrape the coal loose and carry it back to a conveyor. Six rows of carbide mining bits, mounted on an endless-chain arrangement, move continuously around the snout, knocking the coal free. As the coal is ripped away, the operator raises the cutter head to cover the height of the seam. An intermediate conveyor moves the coal from the ripper snout to a rear conveyor that transports it to the trucks. Controls are located 14 feet behind the nose.

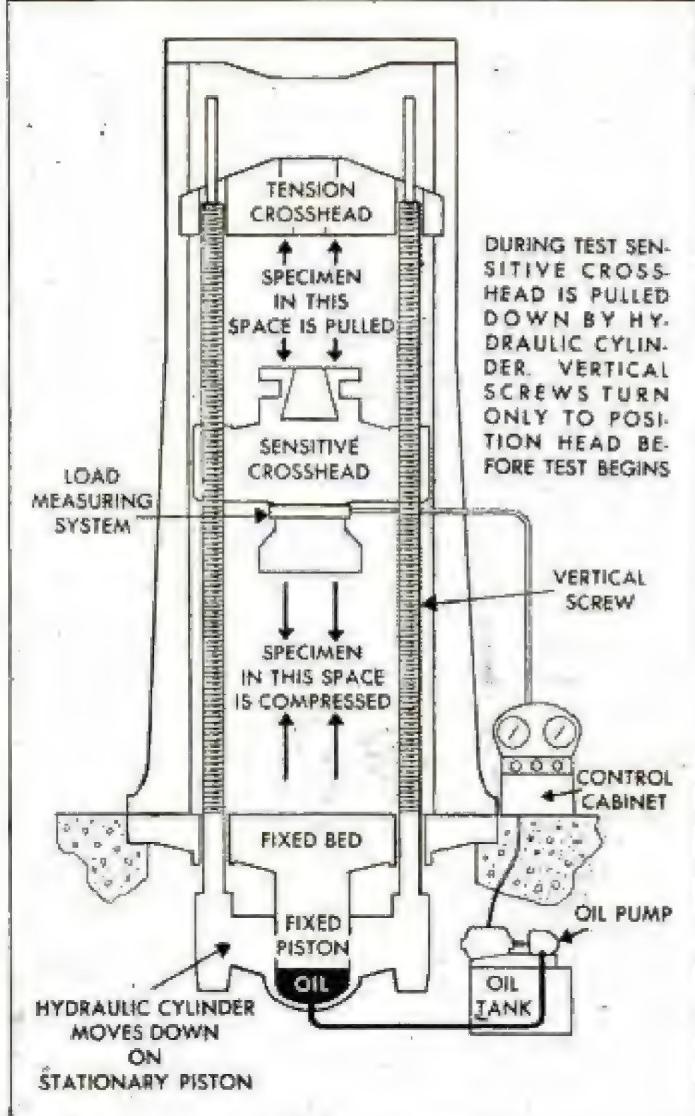
By eliminating all blasting, both machines increase safety and reduce the timbering required to support the roof. Water sprays wet the coal during cutting operations to reduce dust to a minimum, thus improving working conditions.

Both companies are cautious about claims for their new machines, but mine operators who will use them say that their new problem will be to keep the machines from burying themselves in the coal they have mined. They work so rapidly that it will take a conveyor-belt system to keep the coal moving to the surface.



World's Largest Testing Machine Has 5,000,000-Pound Capacity

Load capacities up to 5,000,000 pounds make a new testing machine at the Philadelphia Navy Yard the world's largest. Paradoxically, it will test the lightest aluminum and magnesium structures aeronautical engineers can design. Forty-seven feet high, the new machine handles specimens up to 30 feet high and 50 feet long in the 10 feet between its columns, and subjects them to high stresses in tension, compression and bending. A crosshead at the



top and a bed at the base remain stationary, either tension or compression coming from downward movement of a 136,000-pound steel "sensitive" crosshead. Pacing disks provide constant rates of increasing load or strain. Loads are measured by the Emery cell, a shallow cylinder containing a loose-fitting piston and a metal diaphragm, so arranged that load on the specimen causes pressure change on a thin film of liquid trapped between the piston (and diaphragm) and the cylinder bottom. The ponderous machine registers load variations of as little as five pounds.



Adapter Converts Table Saw Into Horizontal Drill

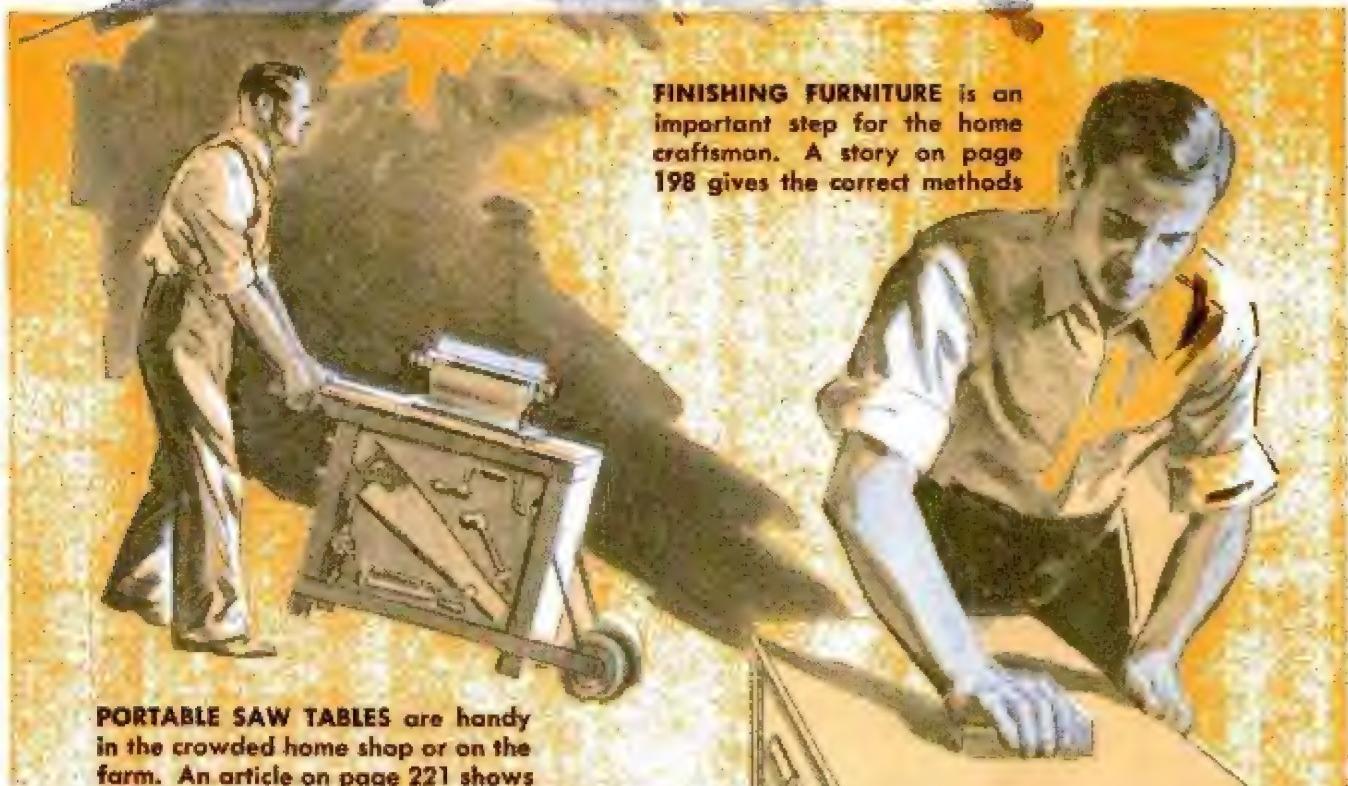
Almost any table saw can be converted into a horizontal drill by an adapter that is installed in a few minutes. The saw blade and the dust-chute cover are removed and the conversion unit mounted in place with the two screws that normally hold the cover. A V-belt driven by a pulley on the saw arbor supplies the power to the drill.

COn U. S. farms today there are 1,880,000 trucks and 4,860,000 pleasure cars.



the craftsman section

CONCRETE STEPS add much to a new home and help to modernize the appearance of an old one. See how you can build them yourself on page 205



FINISHING FURNITURE is an important step for the home craftsman. A story on page 198 gives the correct methods

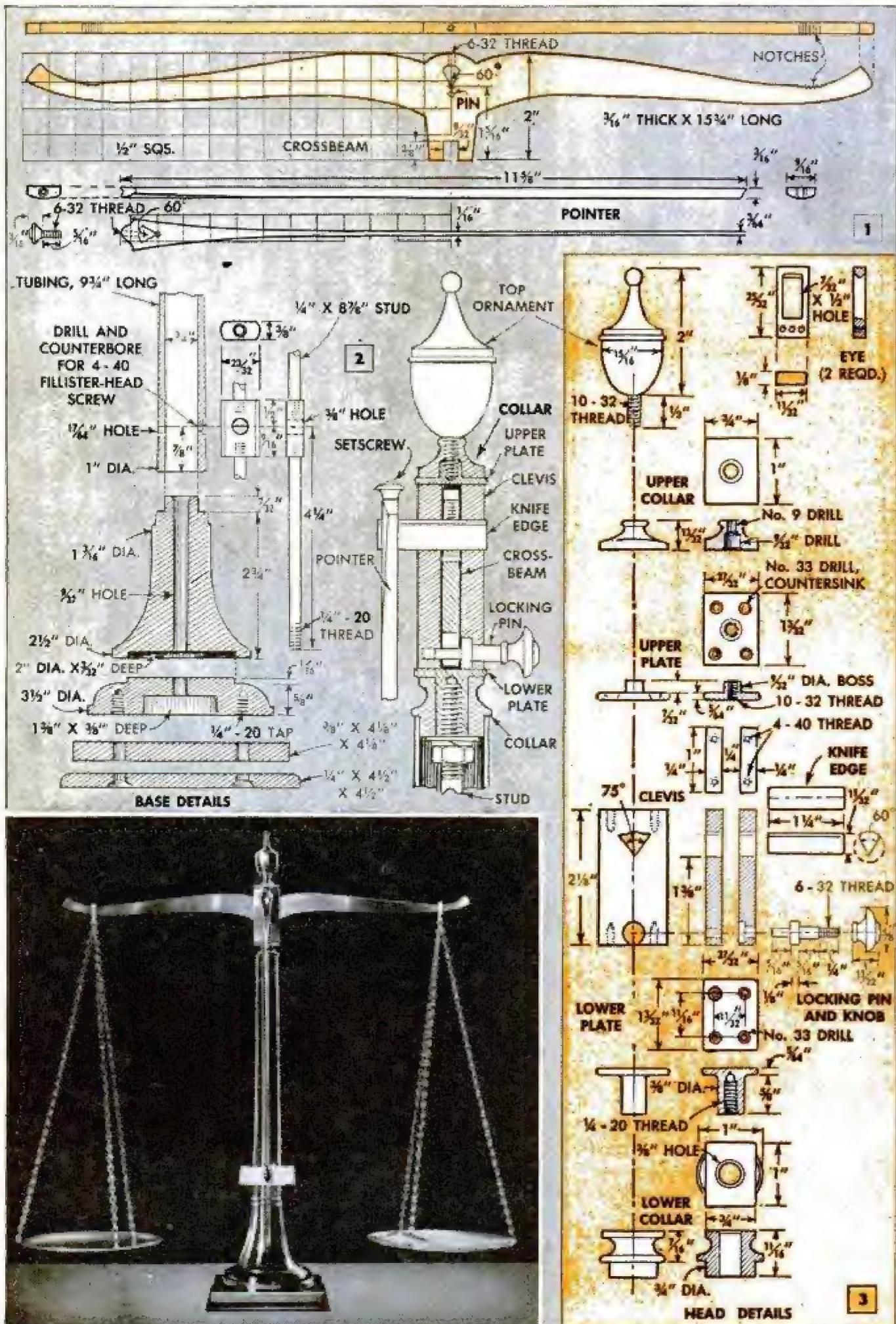


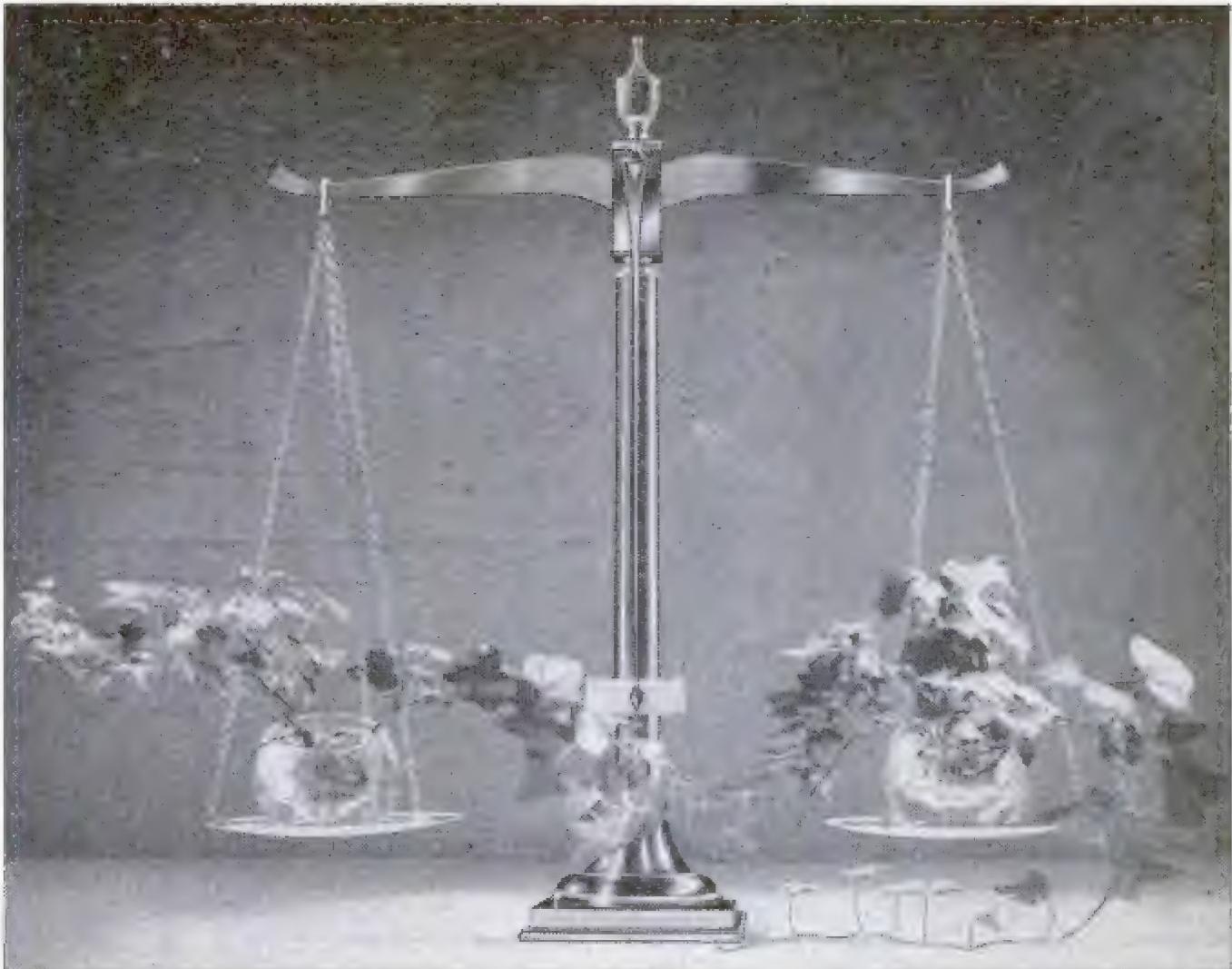
PORTRABLE SAW TABLES are handy in the crowded home shop or on the farm. An article on page 221 shows an unusual saw table of this type



CAMERA REPAIRS made periodically will assure your equipment being ready for that all-important picture. Refer to story on page 215

IVY BALANCE IN BRASS





By John B. Campbell

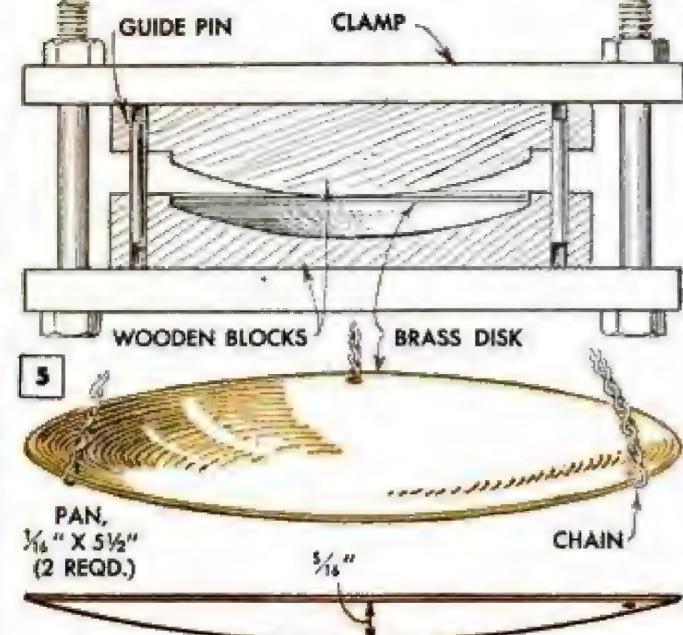
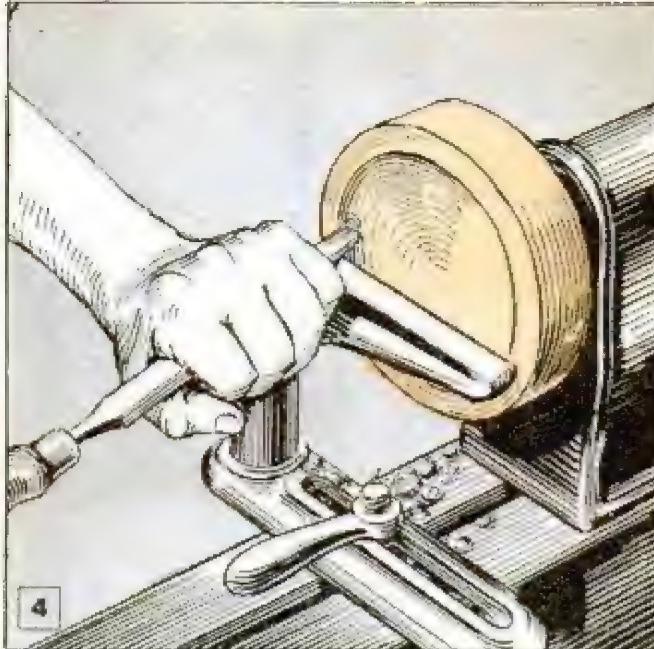
REMINISCENT of early counter scales, this smart-looking ivy balance in gleaming brass provides a distinctive and unusual table ornament. It's a lathe-and-drill-press project and especially aimed at the metalworker who takes pride in turning out an excellent piece of craftsmanship. With the exception of the steel knife edge and the ivory dial, all of the parts are made of brass, although the base and column can be of wood such as walnut, mahogany or ebony, varnished and hand rubbed.

Though the original was designed actually to serve as a balance, provision is made whereby the beam can be locked in a horizontal position to "balance" potted ivy. Details of the three parts comprising the base are shown in Fig. 2. These are drilled and tapped for bolting together with flat-headed machine screws, and the top piece of the stack is counterbored. Next, a flared member is turned which also is counterbored to fit over the shouldered projection of the piece beneath it. The upper end of the turning is turned down to fit inside a tubular post which is tapered from its full diameter at the bottom to $\frac{7}{8}$ in. at the top. After this, a $1\frac{7}{64}$ -in. hole, counterbored for a 4-40 fillister-head ma-

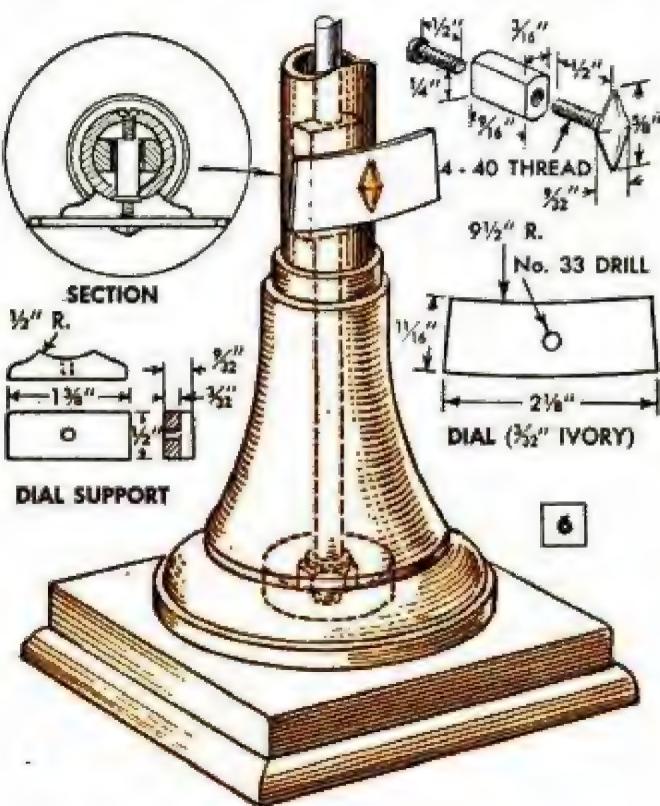
chine screw, is drilled transversely through the post $\frac{7}{8}$ in. up from the bottom.

Next, make the knife edge of stainless steel. This is sawed from $\frac{1}{2}$ -in.-dia. stock and filed smooth to the dimensions given in Fig. 3. Both the locking pin and its ornamental knob, used to lock the crossbeam in a fixed position, are turned from brass. The clevis head and its component parts are detailed individually in the pull-apart view in Fig. 3, and shown assembled in the sectional view, Fig. 2. The two clevis members are fastened to the upper and lower rectangular plates with 4-40 flat-headed machine screws. The plates are first turned to a circular shape and then turned with a boss which is drilled and tapped. The upper plate is tapped to receive the threaded stud of the top ornament, while the lower plate is tapped to take the upper end of the threaded stud which ties the clevis, base and post assembly together. The stud consists of two lengths of rod threaded and soldered into a block as in Fig. 2.

A thin piece of ivory-colored plastic is used for the dial, Fig. 6. This is attached to the post by means of a brass support piece and a diamond-headed machine screw and nut, both being detailed in Fig. 6. The



threaded portion of the screw should be long enough to enter the nut only halfway, the balance of the threads in the nut being taken up by a fillister-head screw from the back. The crossbeam is filed to the shape shown in Fig. 1 and then drilled and tapped, at the point indicated, for a 6-32 setscrew. Care should be taken to make the beam symmetrical and balance it accurately. To balance it, file out the triangular hole and clamp the knife edge in place. Then test the balance occasionally as filing of the beam progresses. Note that a hole made with a No. 55 drill is located at the apex of the triangular hole. This assures a firm grip on the flat surfaces of the knife edge when the setscrew is tightened. The triangular hole must be filed with care to



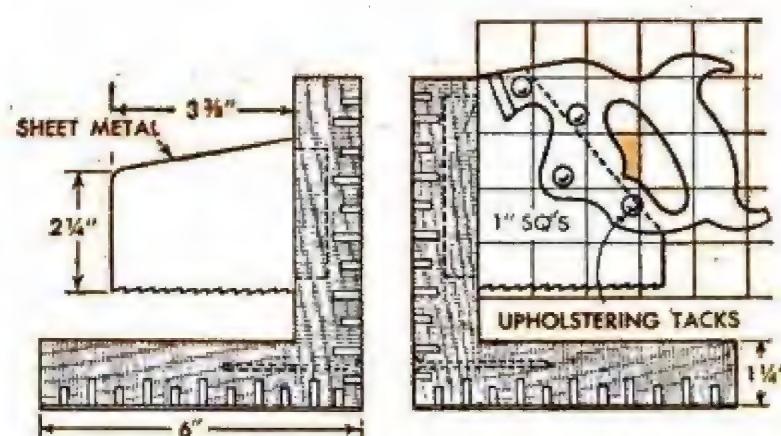
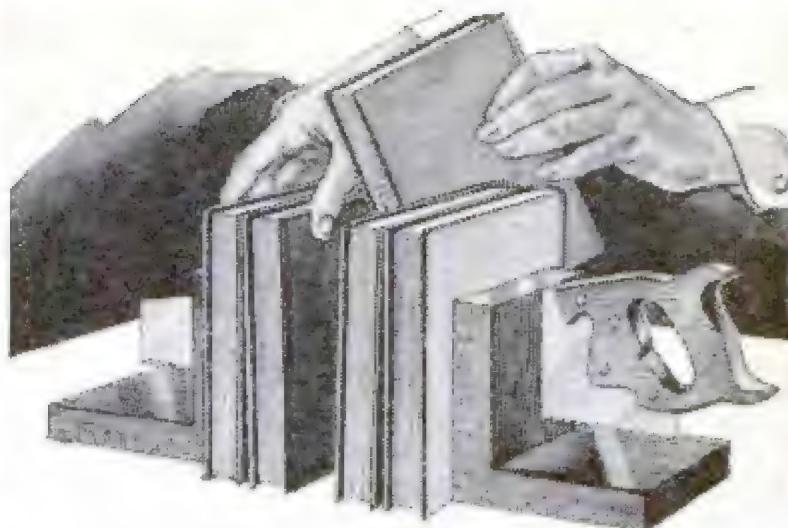
make sure that the knife edge, when clamped in place, assumes a true right angle with respect to the flat surface of the crossbeam. A $\frac{3}{32}$ -in.-dia. pin having rounded and polished ends and of a length slightly less than the width of the space existing between the sides of the clevis, Fig. 1, is driven through a hole drilled in the crossbeam close to the apex of the triangular hole. This pin prevents the surfaces of the crossbeam from rubbing against the inside surfaces of the clevis. The crossbeam is positioned within the clevis and fastened to the knife edge by a setscrew from the top. Access to the setscrew is provided by the hole for the top ornament. Finally, the pointer, cut and filed according to Fig. 1, is attached to the projecting end of the knife edge with a setscrew. The two eyes from which the pans are suspended are filed from $\frac{1}{8}$ -in.-thick brass to the dimensions in Fig. 3. Note that the inside top edge is filed to a blunt knife edge to engage the notches in the crossbeam. Three holes for attaching the chains supporting the pans are drilled in the lower edge of each eye.

Spinning may be employed in dishing the pans, or the dishing can be done in a press like the one detailed in Fig. 5. Two wooden blocks, one being turned concave, Fig. 4, and the other convex, serve as dies between which brass disks are placed and clamped to dish them. Finishing consists of buffing each part individually and then coating it with clear lacquer to prevent tarnishing. If desired, an attractive "graining" can be applied to the clevis parts before they are lacquered. This is done by rubbing them back and forth on a sheet of fine emery cloth placed on a flat surface. The parts are held against a guide strip while rubbing so that the graining will be parallel with the edges of the parts.

Appropriate Book Ends for the Home Workshop

What could be more appropriate to hold your craft books in the workshop than these novel book ends? Although appearing to be piercing the books, the handsaw actually is in two parts and, to further typify a workshop hobby, the bases of the book ends are made to represent carpenter's squares. If an old handsaw is not available, make the saw blade from sheet metal and the handle from hardwood which matches the veneer on the bases. Note that tabs on the ends of the blade sections are glued in slots cut in the base uprights. A better bond is had if the gluing surface of the blade is roughened before the glue is applied. The base of each book end consists of two pine blocks covered with a dark veneer, preferably walnut or mahogany. Glue and nail the blocks together and apply the veneer over the entire surface except the bottom, which is covered with felt. Reproduce graduations on the edges of the bases by inlaying them with strips of light-colored wood.

Axel E. Ogren, Chicago.



Plywood Backing Aids Cutting Plastic With Magnetic Scrollsaw

To simplify cutting sheet plastic with a magnetic scrollsaw, one craftsman adds rigidity to the sheet by clamping it to a plywood backing. This reduces vibration of the plastic, makes the work easier, and lessens the possibility of breaking the sheet.

If the protective paper has been removed from the plastic, the pattern can be drawn directly on the backing. Small pieces of plastic can be similarly jigsawed by securing them temporarily to the backing with mucilage or water-soluble glue.

It's Coming Next Month—

POPULAR MECHANICS MASONRY HOME

Our Answer to Your Housing Problem

- The less expensive sequel to our *Build-It-Yourself Frame House*, it is a cozy home of five large rooms—living room, two bedrooms, bathroom, cabinet kitchen and utility room—approximately 674 square feet of comfortable living space. And it is all yours, complete with laundry and heating plant, for less than \$3650 if you build it yourself. Anyone who can mix mortar and cement can build the house. Carpentry consists mainly of putting on a simple hip roof. Insulated floors are poured concrete, exterior walls are concrete blocks stuccoed outside, and partition walls are tile. Walls in all rooms are furred out and plastered. In the descriptive story next month, see how easily anyone can build this beautiful, lasting home.

Solving

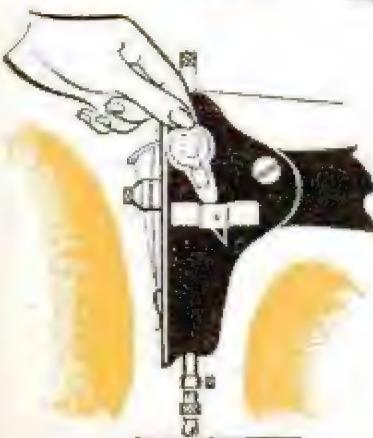


Placing a wadded napkin in a Thermos-bottle cover keeps the cork from working loose. When the cover is tightened, pressure of the napkin holds the cork securely in place

Made of aluminum tubing, this piecrust vent produces a crust unmarred, except for a hole in the center. Half of the tubing is cut in four parts bent outward



Plastic shower-curtain hooks provide attractive hangers for pot holders. The rustproof hooks come in bright colors and allow the pot holders to be hung easily from either a screw hook or a nail



To keep a needle threader handy, store it in a holder made by attaching an adhesive bandage to the sewing machine. Slip threader under gauze portion of bandage



Lubricating zippers that have a tendency to stick is done simply by rubbing the teeth with wax. Occasionally lubricated in this way, the zippers will function smoothly

Home Problems



If you do not have a glass funnel when pouring corrosive liquids into a small-necked bottle, the rubber cap from an extension-cord plug provides a good substitute in a pinch



When power fails, an emergency lamp can be improvised by floating a thin piece of cork, which holds a string wick, in a glass filled with salad oil



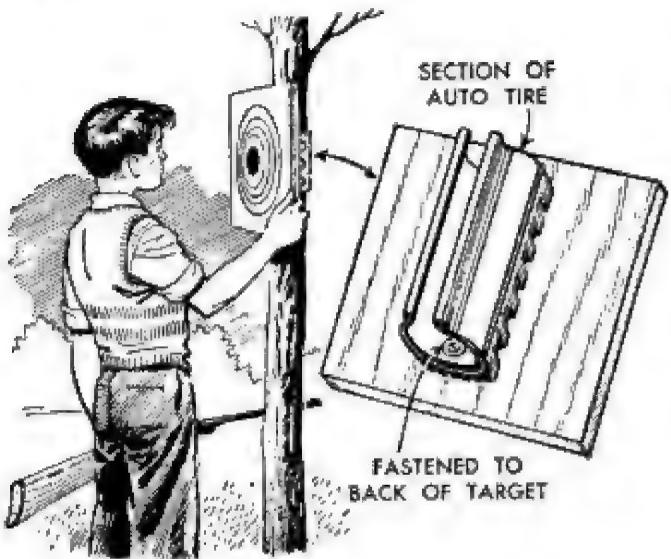
The glass shades of hurricane lamps will stay clean and retain their sparkle longer if they are wiped with alcohol. Wash the shades as usual and wipe with an alcohol-moistened cloth

In many cases, applying vinegar to the joint of a broken chair rung or slat will loosen the glue sufficiently to permit easy removal of the part. Apply the vinegar with a small oilcan and allow to stand for a few hours. Repeat application if necessary



A wire coat hanger forms a neat trellis for a potted vine. The hanger is bent into a figure eight and the hook is straightened and inserted in the dirt

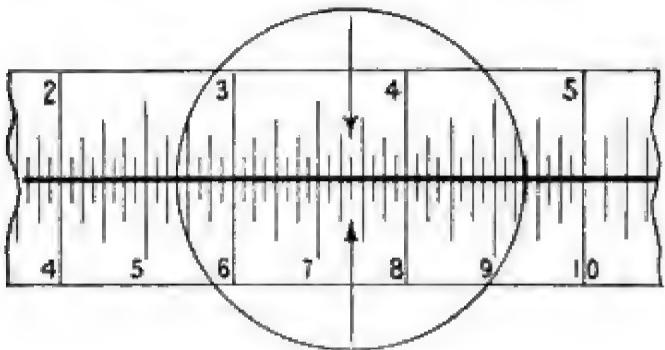
Air-Rifle Target Held on Tree With Auto-Tire Section



Fastening a section of old auto tire to the back of an air-rifle target permits clamping it to a slender tree or fence post. The tire section should be attached with screws and washers so it will not pull loose from the target when the latter is taken down.

Easily Made Calculating Scale Speeds Figuring Dimensions

To save time when working with fractional dimensions, I made this handy calculator which is ideal for simple multiplication and division. The upper half of the calculator is 12 in. long and marked off in $\frac{1}{16}$ -in. divisions. The lower half, also 12 in. long, is marked directly under the upper half but into 24 major divisions. Each major division has eight minor divisions located to coincide with those on the upper scale. In this way, any reading on the lower scale



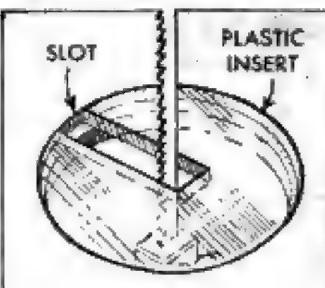
is exactly double the opposite figure on the upper scale. To multiply a dimension by two locate the dimension on the upper scale and read the answer directly below it on the lower scale. An example is given in the drawing. Any figure from zero to six can be multiplied by four by doubling it, as above, locating this result on the upper scale and then reading the final answer directly below it. The reverse procedure, of

course, is used for division, the original figure being located on the lower scale, and the answer read on the upper scale.

Harry M. Suttle, Sacramento, Calif.

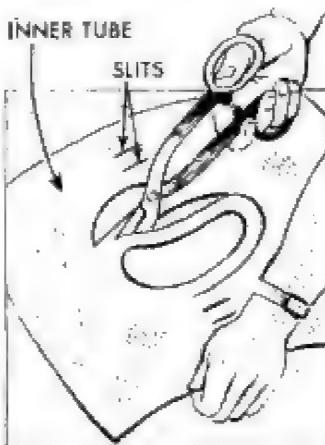
Plastic Insert for Jigsaw Table

If the metal insert in a jigsaw table is replaced with one of clear plastic, the lower chuck can be seen easily, permitting quick changing of the saw blades.



Rubber Bands of Different Sizes Cut From Inner Tube

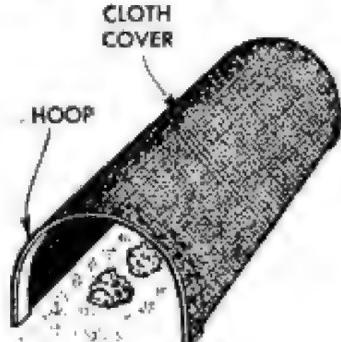
Rubber bands of varying sizes can be cut from sheet rubber or an inner tube by using this novel method. First cut a section from the inner tube and then split it along the seam. Now fold the piece double and cut slits in the crease, their location being determined by the size and thickness of the rubber bands required. Using the slits for a guide, cut out the rubber bands as shown in the drawing. Tinner's snips are excellent for cutting the inner tube, although a pair of inexpensive shears will do the job satisfactorily.



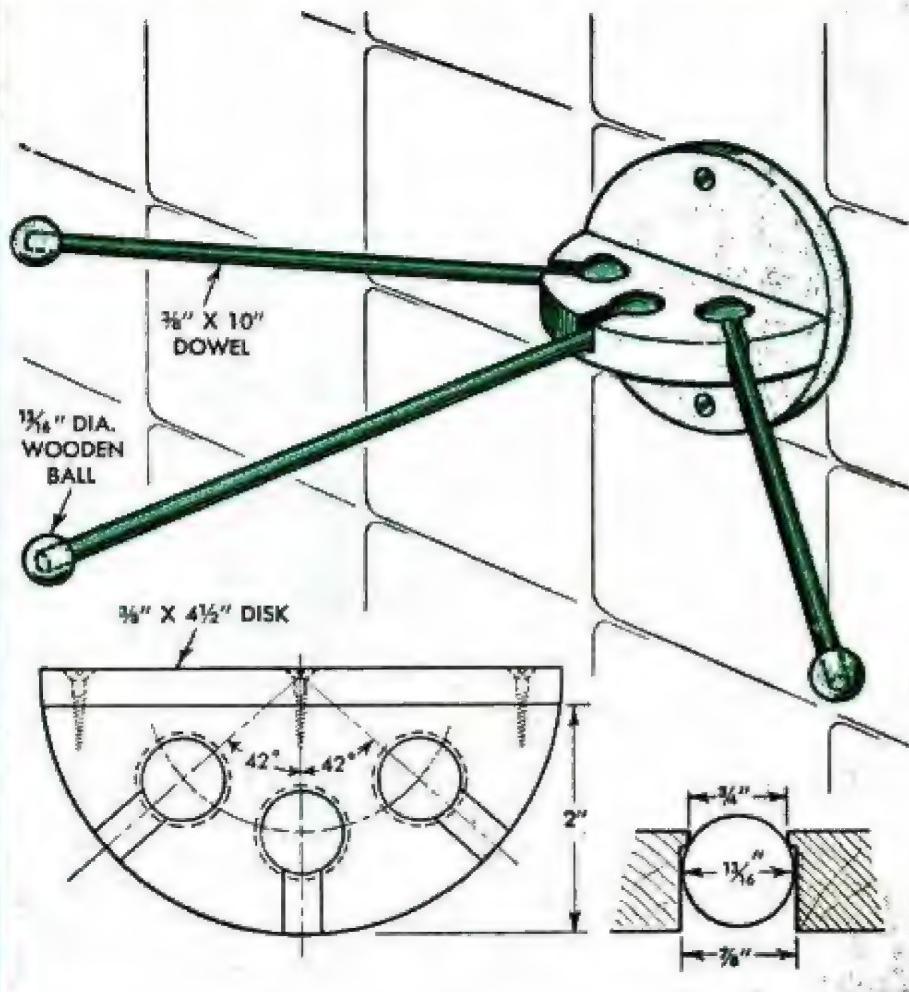
H. I. Hawhurst, Sierra Madre, Calif.

Cloth Cover Protects Seedlings

Sturdy covers to protect tender plants from the direct rays of the sun can be made by tacking strips of cotton cloth to wooden hoops. If the ends of the hoops are pressed well into the ground, there is little danger of the covers being blown away. Any number of strips can be sewed together to make the cover as long as desired, and extra hoops should be used at intervals to reinforce the covers along their length. If preferred, metal hoops can be used and the cloth sewed to them.



Folding Towel Rack for Kitchen or Bathroom



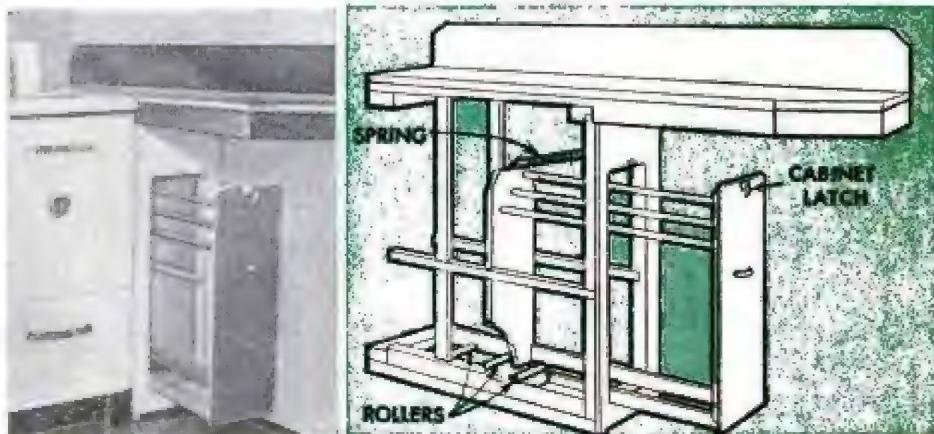
If you want something different in a towel rack, here's an exceptionally neat one that retracts against the wall. Lengths of birch dowel form the arms and balls turned from walnut are glued over the ends. Holes in the wall bracket must be counterbored carefully, as the counterbores serve as stops for the ball ends of the arms. To fold the rack, simply lift each arm and release it. The arm then falls to the vertical position as in the photo. Reverse the movement to bring the arms to the horizontal, or open, position.

100 W.P.

Combination Drier and Utility Shelf Installed in Waste Corner Space

Damp dishcloths and towels or an occasional piece of clothing can be dried out of sight, and the kitchen kept neat as a pin, if this combination drying rack and utility shelf is installed in space that otherwise would be wasted. Although the original unit was made to fit between a kitchen range and an adjacent wall, a similar rack can be fitted between cabinets or in any unoccupied corner. The drying rack consists of two plywood panels separated by lengths of dowel and bottom braces. Note that a window-shade spring is fastened to the back of the rack and the front panel covering the framework. This causes the rack, which is held closed with a cabinet-door catch, to spring open as soon as the catch is released. For smooth operation, the

rack rides on dowel rollers. These revolve on pins made by driving nails into the ends of the dowels and filing off the heads. The plywood utility shelf can be covered with linoleum or hardboard. However, if you wish to set hot pots and pans on the shelf, cover it with sheet aluminum. If the installation is made next to an uninsulated range, be sure to mount a piece of asbestos between the drier and the range.



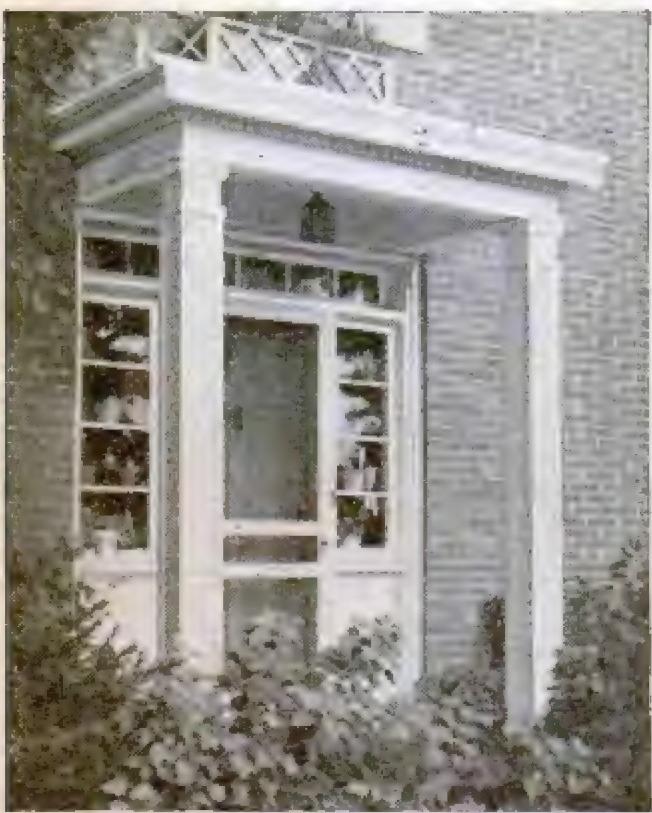
ATTRACTIVE ENTRANCE



Flanking shutters with deep louvers lend the only modern touch to this fine doorway of colonial styling. A simple arched pediment and paneled wings recess the six-paneled door back from the wall line. Hand-wrought hardware completes the period detail.



Definitely modern in design, this door is especially suited to the low-line architecture of small homes. Curved strips of polished chrome break the flat plane of the flush door in its recessed frame. A wide, curved lockplate adds a modern ornamentation.



An ornate post-supported canopy shelters this glass-paneled doorway which is installed on the wall line. A wide transom is designed to balance height and width nicely. Shelves behind the glass panels provide space for a display of ceramics or potted plants.



Modified modern design is suited to large homes or small ones of either new or old architectural lines. This doorway is readily worked into modernizing and remodeling plans. The plain recess is flanked with coved stonework and curves smoothly into wall line.

DOORS

By Bob Hurst

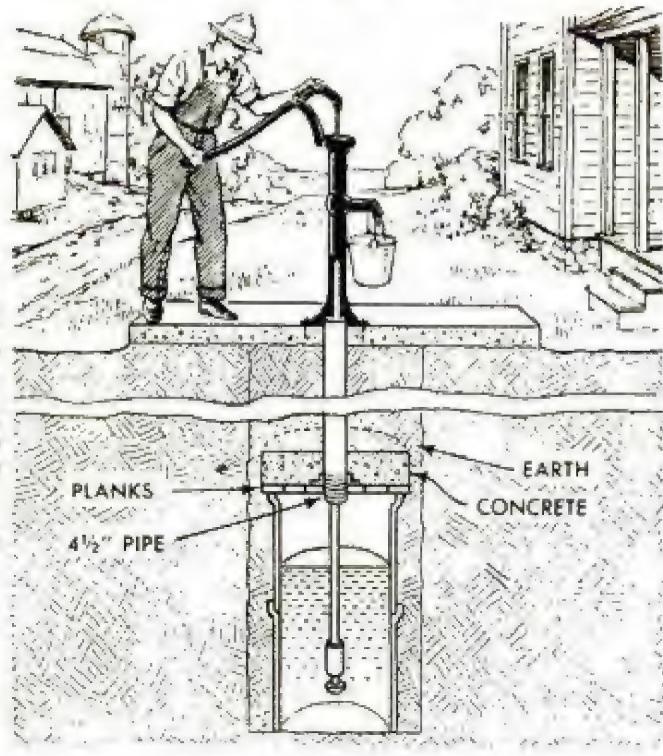
STYLED to the architecture of the home, front doorways are the final finishing detail. In selecting the type of door, whether it be for new construction or for use in remodeling an older home, careful consideration should be given to exposure, distance between windows on the same wall, size of windows and the height of the doorsill above grade. Recessing the door into the wall, as in several of the designs shown, helps to protect it from weathering. Where the door is framed on the wall line, a canopy gives the same protection and generally adds an attractive detail as well. Recessed doorways of colonial design are best suited to large homes of traditional architecture. New homes with low roof lines call for doorways of modified modern design and construction.



Guarded by heavy ornamental-iron grille and framed by colored glazed tiles set in the masonry wall, this deeply recessed doorway is easily adapted to the modernized types of Spanish architecture. It appears at its best when installed at grade level



Plain straight lines of massive woodwork, flared side panels and an ornamental-iron pediment rail characterize this doorway. Note the similarity between it and a later type shown in photo at upper right. Both are suited to large two-story homes



When digging a shallow well, you can save the cost of several tiles by installing a concrete cover just over the water level and running a length of 4½-in. pipe up to the pump. You probably can obtain a length of used pipe at a junk yard. Build a platform of planks over the rim of the last tile required, leaving an opening in its center for the pipe. Fasten a flange over the opening in the platform and, after threading the lower end of the pipe, turn the pipe into the flange. Then, temporarily supporting the top of the pipe with 2 x 4s, pour an 8-in. layer of concrete over the platform. After the concrete hardens, fill the rest of the wellhole with earth and complete installation of the pump.

Alex Owen, Schenectady, N. Y.

Paint Can From Cream Carton



If you are unable to find a can for a small amount of paint, a cream carton will serve the purpose. Just enlarge the pouring spout in the top and wash and dry the inside of the carton.

Trolling With Outboard Motor

To troll at very low speeds with an outboard motorboat, use a motor with full reverse and operate the boat stern-first.

The drag of the transom will maintain a speed as you wish. Be sure to stay away from shoal water, as the motor cannot be tilted in this reversed position.

Scribing Parallel Lines on Cylinder

Sometimes, when working with wood or metal, it is necessary to scribe a line on a cylinder parallel with its axis. This can be done easily by using a length of angle iron as a straightedge. The angle iron naturally assumes a position parallel with the axis and is not likely to slip.

John M. Avery, Delhi, N. Y.



Blotter Removes Decals

A wet blotter placed over a decal on a painted surface will loosen it sufficiently to permit removal with a dull knife without marring the finish. The blotter should remain over the decal for a couple of hours.

A. E. Fenn, Chicago.

Burned-Out Fluorescent Tubes Form Novel Porch Trellis

Instead of discarding burned-out fluorescent tubes, you can use them to make an attractive trellis for the porch or terrace. A window box serves as a base, and a vertical member at each end of the box supports the tubes as shown in the detail.

H. T. Gunderman, New York City.



LAMPS FANTASTIC

By Norbert Engels

IT IS FANTASTIC to think that lamps like these bring fancy prices in expensive shops, but even more so when you realize that they are made from old pewter jugs and pitchers, ornamental tobacco cans and painted glassware which, in many cases, are simply tossed out. There's practically no limit to what can be used for the lamp bases. It's a case of giving your imagination free rein. Combined with standard fittings or ones salvaged from old lamps, the parts required cost practically nothing. The examples given here show what can be done. The smart copper lamp shown below at the left was made from a 1-gal. oil measure, polished and lacquered and wired for a socket. The base for the nautical lamp shown below at the right is made from a decorative tobacco can and odd parts of several old lamps.



Above, left, a decorative candy can used for the base of this lamp is fitted with a socket fixture taken from an old lamp. The end of the fixture is attached to a wood block fastened to the bottom of the can. Above, right, shows an old-fashioned oil lamp that has been converted to an electric one by replacing the wick unit with a standard socket assembly



When building new furniture or restoring old pieces, each step of the finishing process, from bleaching and filling to varnishing or lacquering, is of the utmost importance. Perfection, of course, comes only with practice, but the following information will get you off to a good start.

Part III

Furniture for Filling, Staining

AFTER COMPLETING the bedroom furniture described in the previous two issues, it's time for the all-important job of finishing it, because right here you can either flatter or ruin the appearance of the furniture.

No doubt, you have built the furniture of a wood suitable to take the particular finish desired, whether it be harvest wheat or heather mahogany, ambered walnut or limed oak. Naturally, the kind of wood used is a determining factor as, for instance, one cannot expect to obtain a limed-oak finish on birch. The finishing schedules presented below give a condensed procedure to follow in producing

a number of the popular, modern finishes, but, if the final results are to compare with finishes seen on store furniture, the finishing operation demands the same careful attention that you put into the cabinet work. Brushes and materials, as well as the room where the work is done, must be clean. Finishing should not be attempted in a cold room and the materials should not be cold. These precautions are important.

Sanding: Perhaps the most important

FINISHING SCHEDULES

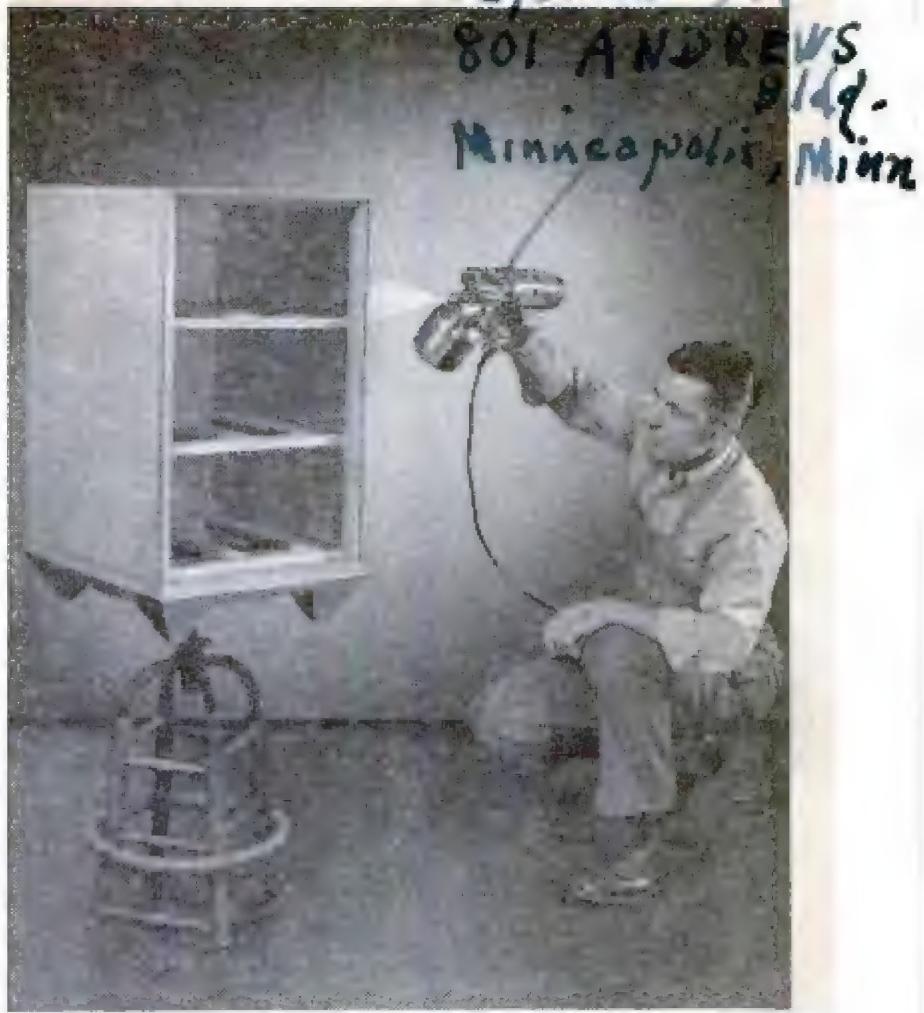
FINISH	APPLICATION
Ambered walnut	Bleach. Stain with amber stain. Apply sealer coat of thin lacquer. Fill with natural filler. Finish with clear lacquer.
Old-World walnut	Bleach. Seal. Fill with natural filler lightly tinted with burnt umber. Seal. Shade with brown wiping stain. Finish with clear lacquer.
Honeytone maple or birch	Tone with blond toner, using 1 part white lacquer to 4 parts clear, flat lacquer. Finish with water-white lacquer.
Pickled pine	Bleach. Stain with gray stain for pine. Finish with water-white lacquer or clear varnish.
Limed oak	Bleach. Seal. Fill pores with white paste wood filler. Finish with water-white lacquer.
Harvest-wheat mahogany	Bleaching will give required wheat color. Fill with natural filler lightly tinted with raw-sienna color in oil. Finish with lacquer.
Tweed mahogany	Bleach. Seal. Fill pores with red paste wood filler. Finish with water-white lacquer or clear varnish.
Heather mahogany	Bleach. Seal. Fill pores with white paste wood filler. Finish with water-white lacquer or clear varnish.

step in producing a beautiful, flawless finish is the sanding of the wood. Application of any number of finishing coats will not compensate for a careless job of sanding, but only tends to emphasize defects. Power sanders of the oscillating or belt types take the work out of sanding; however, if these are not available, you can do a satisfactory job of sanding by hand, wrapping the paper around a flat, felt-covered block and working with progressively finer grades of garnet paper from medium down to 5-0 grade.

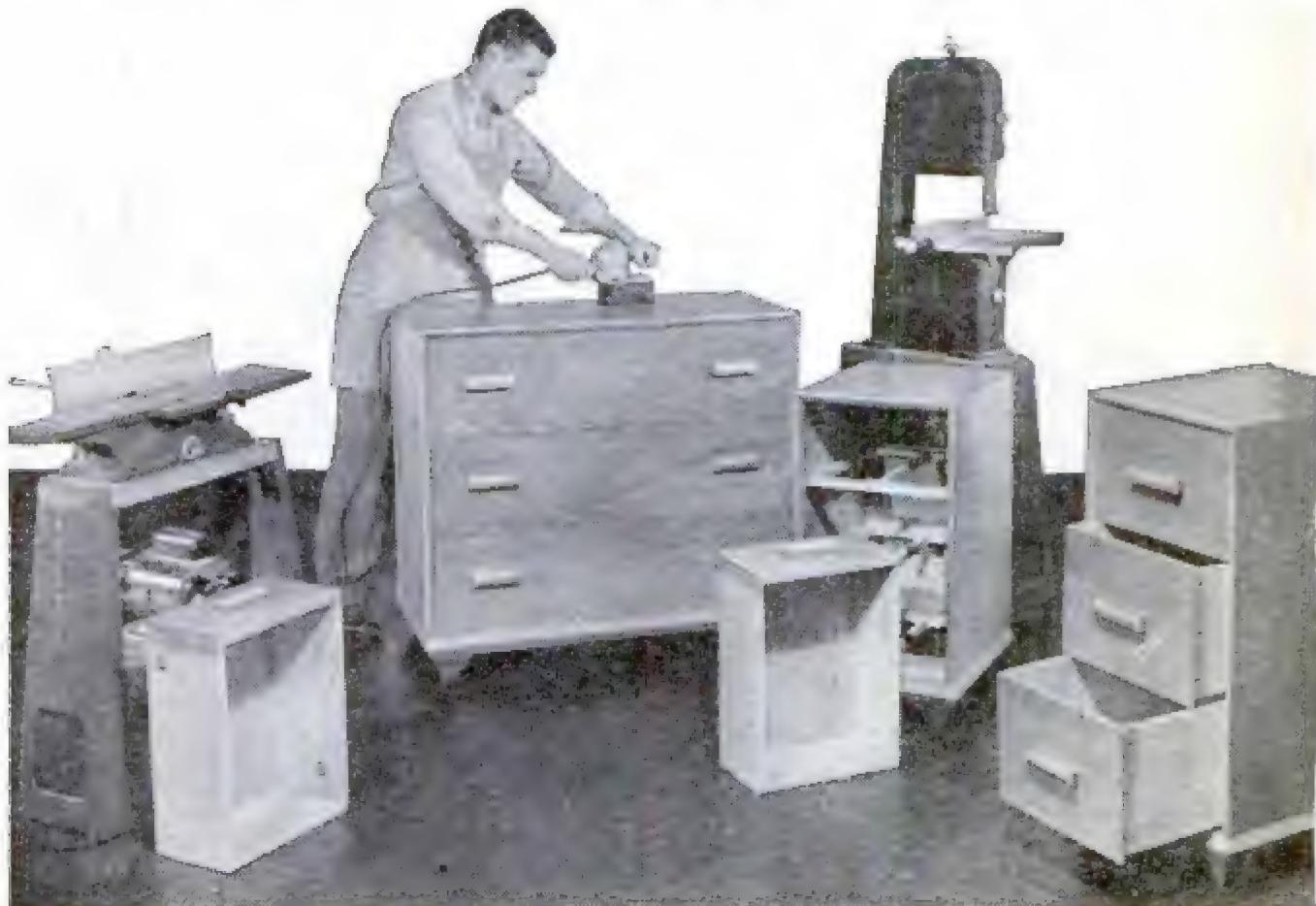
Bleaching: Practically all of the

Your Bedroom and Varnishing

so-called blond finishes are produced by first bleaching the wood to remove its natural color. This is done to obtain such popular mahogany finishes as harvest wheat, heather and tweed, and limed oak, and ambered walnut. Mahogany, when bleached and filled with white filler, is known as heather mahogany. When filled with red filler (natural filler with red oil



Above, a piano or draftsman's stool provides an excellent turntable when spraying lacquer on the smaller units. Below, a power sander makes play of sanding the broad, flat surfaces, but care must be used to avoid cutting through the top veneer





M. T. CAMPBELL CO.
19TH ST. NO.
703 E. CITY, IOWA.

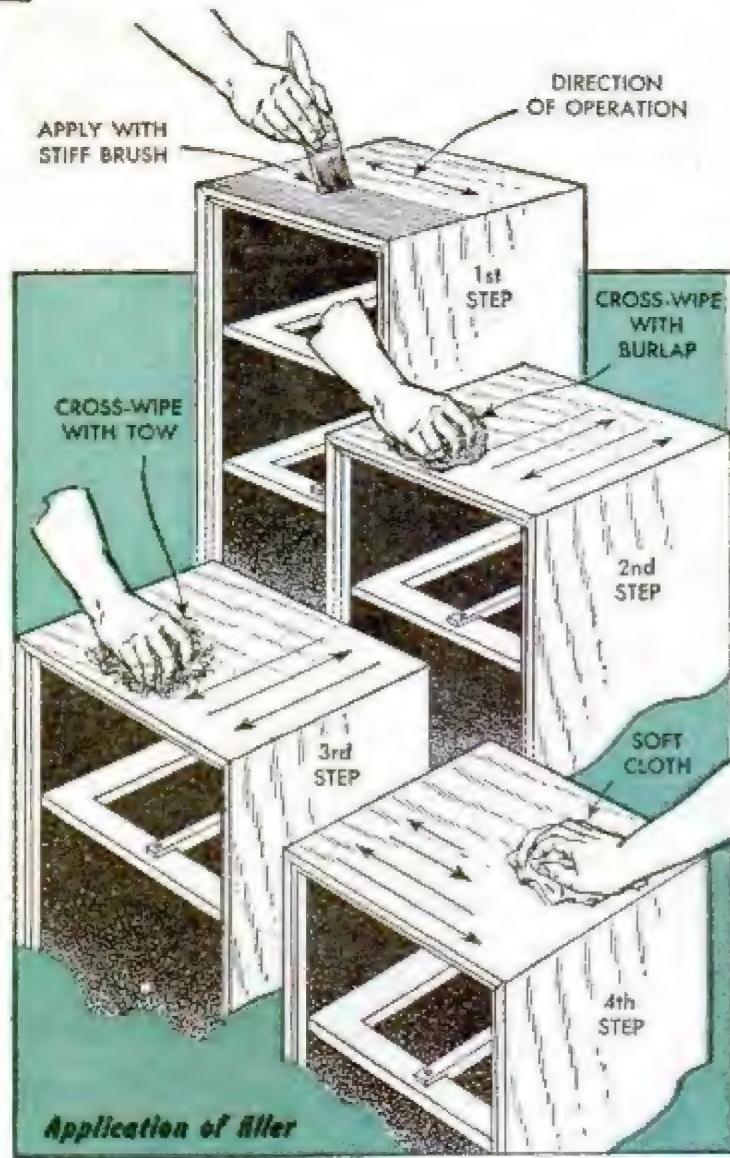
In bleaching the wood to produce any of the popular blond finishes, the chemical solution is swabbed on the work with a rubber sponge. As the bleach is corrosive, wear rubber gloves

color added), it is called tweed, because of its pleasing pink tone. Bleached and filled with natural filler, it's called harvest-wheat mahogany. After bleaching, almost any color desired can be had by giving the wood a coat of diluted stain.

Bleaching is done with a commercial chemical solution consisting of two separate solutions which are mixed together and used immediately. As all bleaching solutions are highly corrosive, they should be handled carefully and applied with rubber gloves. Use a sponge to swab the solution on the wood and see that you wet the entire surface evenly. One application of bleach is usually sufficient although, in any case, it is good practice to make a test on a wood sample. Let the bleach stand and dry for 48 hrs.

Filling: Open-grained woods, such as oak, walnut, mahogany, etc., must be filled, that is, the pores of the surface and end grain must be packed level with a prepared paste filler. Fillers are available for either lacquer or varnish finishes and require cutting with benzine or turpentine to the consistency of thick cream before apply-

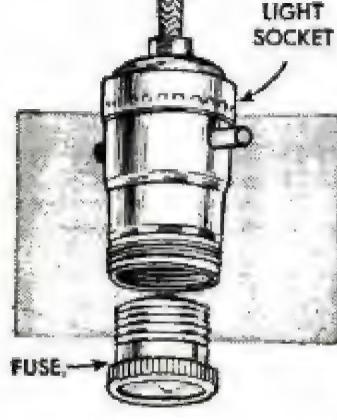
ing, so that they will sink into the pores. The filler is applied liberally in the direction of the grain, preferably with a short-bristled brush. Do not cover more than 6 or 8 sq. ft. of surface at one time or you will get ahead of the wiping and cleaning-up operations that follow. As soon as the filler flattens, it is wiped off. This is done by wiping across the grain with a coarse cloth such as burlap, or excelsior, using a circular motion. This is followed by cross-wiping with a fine material called tow, commonly used for upholstering purposes. This second wiping cuts the surplus filler flush with the surface of the wood. A third cross-wiping with a soft cloth wrapped around a felt block is excellent practice. A second application of filler, somewhat thinner than the first, is sometimes required when filling mahogany or other wood having a very open grain. This is determined by noting whether the pores are completely filled. Finally, the work is wiped lightly with the grain, using a soft cloth. This serves to remove any traces of filler missed in the towing-off operation. The filler should be allowed to dry 24 to 48 hrs. and then sanded very lightly with 5-0 wet-or-dry garnet paper.



Toning: Toning is not successful on dark wood such as walnut, but very much so on naturally light-colored woods such as birch and maple. Toning, to some extent, takes the place of the bleaching process and is accomplished by spraying the bare wood with a semitransparent undercoat to lighten the wood. Toning is recommended for all extremely light finishes, as it does not obscure the grain, being almost as clear as water. Toner is made by adding white lacquer, 1 part, to clear flat lacquer, 4 or 5 parts. In the case of oak and mahogany, the toner should be made with tan-colored lacquer instead of white.

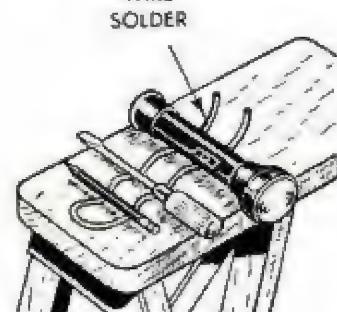
Sealing: Whether or not the bleached wood has been toned or stained, the surface must be sealed with a wash coat of shellac or lacquer before the work is filled. The wash sealer is made by cutting 1 part of clear shellac or lacquer with 6 parts of thinner. This coat is sanded lightly when dry, and then, after the grain is filled, a second sealer coat is applied. This is likewise sanded when dry, and followed with a coat of varnish or lacquer sealer. The latter coat, which fills any tiny open pores remaining, also is sanded. From here on, varnish or lacquer coats are applied, using a rubbed-effect or full-gloss type.

Improvised Pendant Switch



turn a 15-amp. fuse into the socket to complete the circuit, and the socket will operate in the same way as a switch.

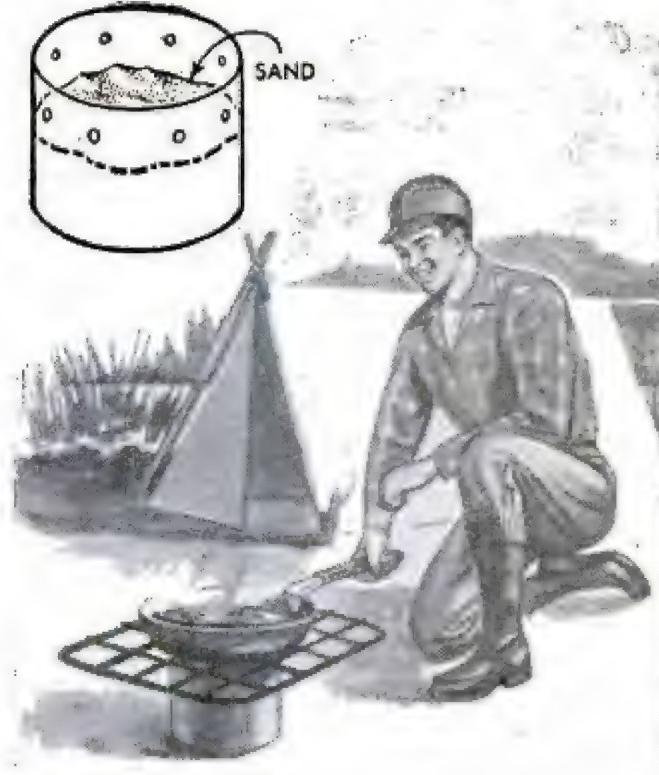
Tools Held on Stepladder Top By Length of Wire Solder



If the pendant switch on your kitchen or bathroom ceiling light breaks, here is a substitute that will serve the purpose until a new pendant switch is obtainable. Remove the broken switch and wire a push-button lamp socket in its place. Then,

Especially handy when making overhead electrical repairs, a length of wire solder, doubled and crimped as shown, will prevent small tools from rolling off a stepladder.

Coffee Can Serves as Camp Stove

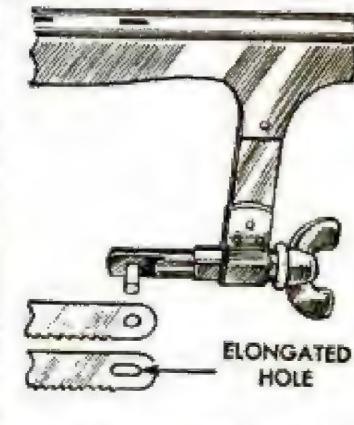


For camping, picnics or long motor trips, an old coffee can provides a cookstove that heats for almost half an hour without refueling. Fill the can two thirds full of sand and punch ventholes around its side just above the level of the sand. Then pour about two thirds cup of gasoline or fuel oil over the sand. Caution: Do not pour gasoline or oil over hot sand. Allow the sand to cool for at least five minutes before refueling the stove.

Arthur F. McConnell, Kansas City, Mo.

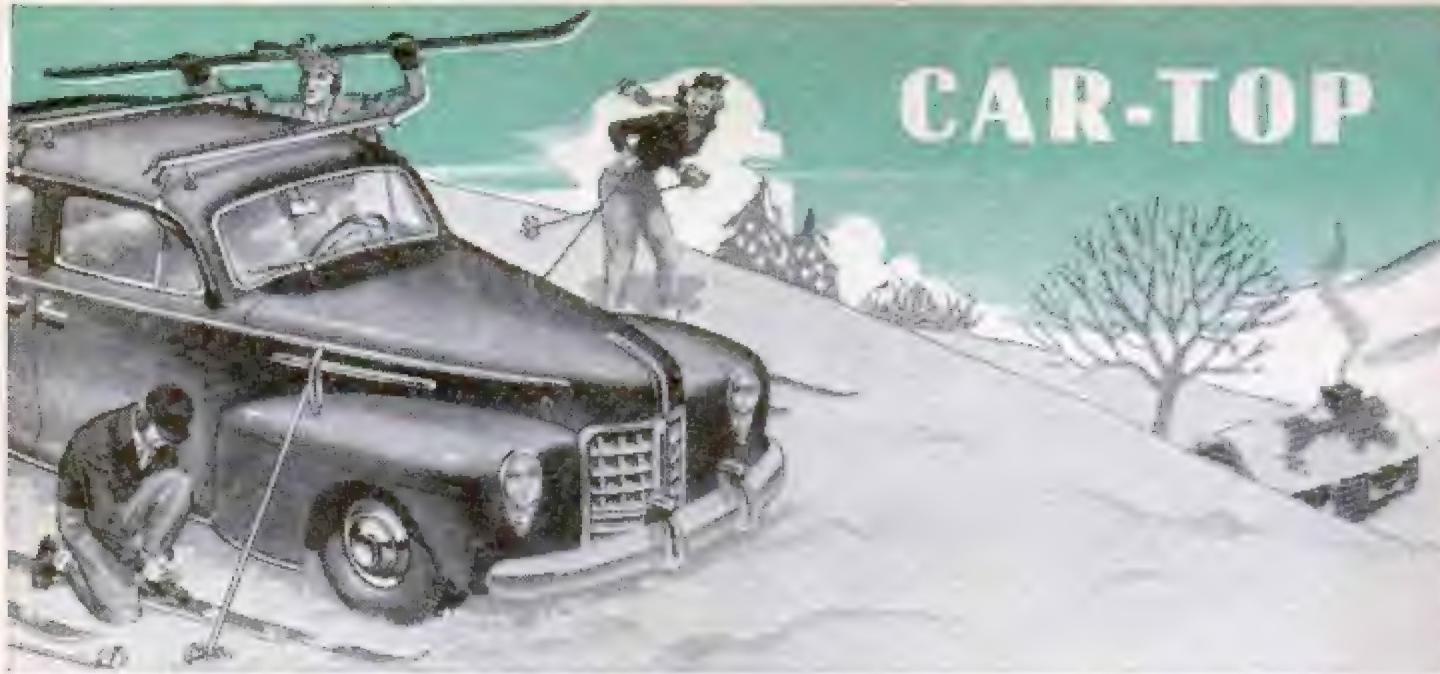
Thin-Wall Tubing Sawed Quickly

To saw thin-wall tubing quickly and easily, fit two blades into the hacksaw, staggering the teeth. The latter is done by elongating one hole in each blade with a rattail file, the elongated holes being made at opposite ends of the blades. The staggering prevents the teeth from hooking on the edge of the thin metal and permits the blades to cut like a file. In addition, if one of the blades is reversed, the saw will cut on both strokes, speeding the job considerably.



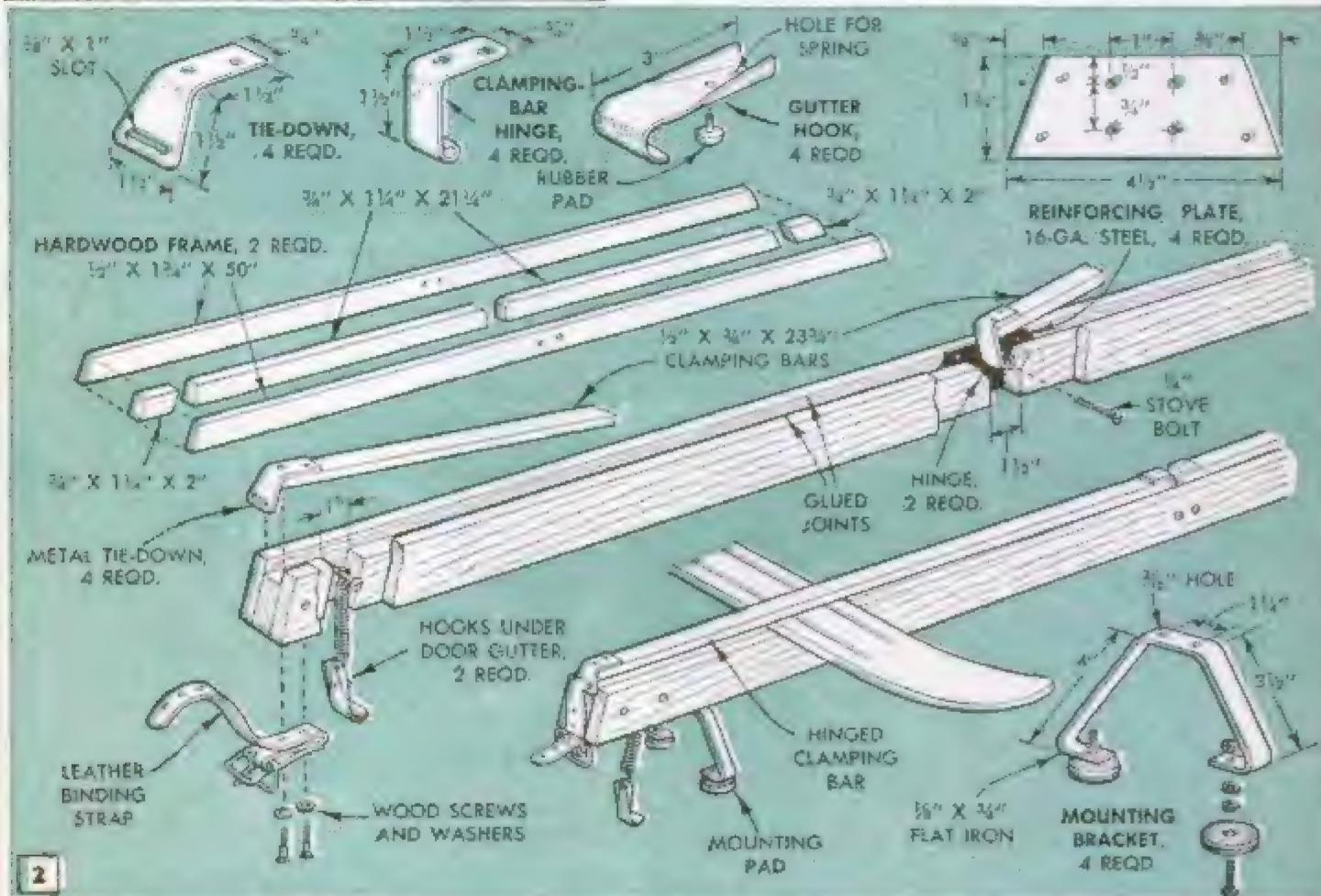
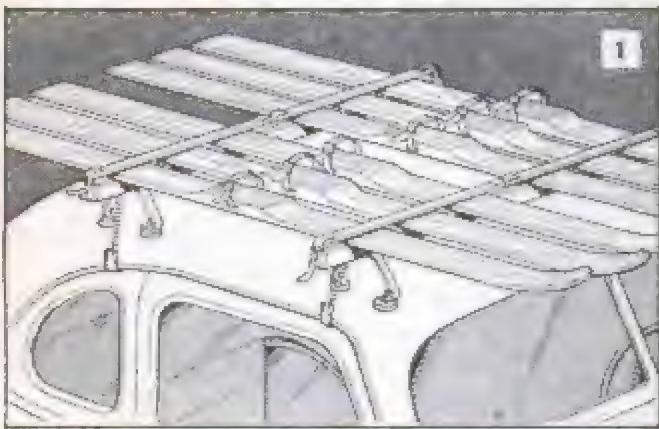
A heavy steel spring used directly above a small boat anchor will act as a shock absorber during rough weather and thus help prevent the anchor from dragging.

CAR-TOP



By Thomas E. Riley

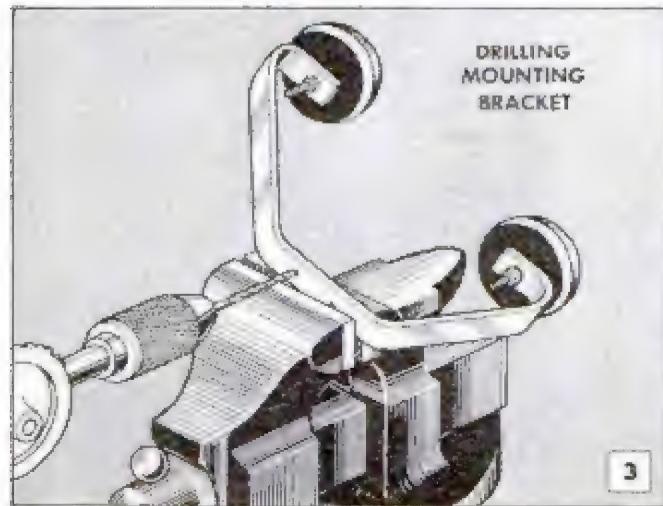
THIS DUAL-PURPOSE ski rack not only solves the transport problem for skiers, it serves equally well as a car-top canoe rack during the summer sport season. No extra parts are necessary to adapt it to either use. It consists of two laminated wooden frames resting on padded brackets, the frames being attached to the car top with spring-tensioned hooks shaped to catch under the car-door molds, or gutters,



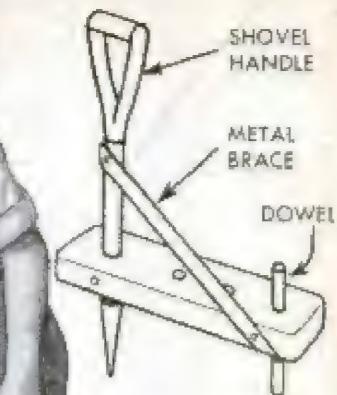
SKI RACK



Fig. 1. Each wooden frame is assembled from six pieces of choice straight-grained spruce or birch, cut to the shape and general dimensions given in the details in Fig. 2. The outer members of each frame are reinforced with sheet-metal plates screwed to the inner face. After the plates are fastened in place, two pairs of holes are drilled through each plate and the wood to which it is joined. The location of these holes is shown in the upper right-hand detail in Fig. 2. Spaced as indicated, they provide dual settings for the clamping-bar hinge pins. Use waterproof glue when assembling the frames. Hard maple is the best wood for the clamping bars. Special hinges for the bars are made by reshaping two pairs of 6-in. strap hinges. These are bent to an L-shape as detailed in Fig. 2. Outer ends of the clamping bars are fitted with slotted metal tie-downs through which the free ends of the binding straps are passed. The tie-downs are bent to a 60-deg. angle and the ends of the clamping bars are sawed to the same angle to provide additional support. Bend the mounting brackets to the approximate shape shown in the lower right-hand detail, Fig. 2, and fit them with rubber suction cups or rubber pads. To use the rack as a canoe rack, withdraw the clamping-bar hinge pins, lower the clamping bars into the grooves in the tops of the frames and insert the hinge pins in the lower holes in the reinforcing plates.



DRILLING MOUNTING BRACKET



Combination Dibble and Marker Spaces Plants Uniformly

From an old shovel handle and a couple of wooden strips you can make an adjustable dibble that will enable you to space seedlings uniformly when transplanting them. Just point the lower end of the handle and insert it through a hole drilled near one end of a wooden block of the desired length. Brace the outer end of the block and drive a screw into the edge of the block to engage the handle. A short dowel serves as a marker and three or four holes in the block permit the marker to be adjusted for spacing the plants.

Marion L. Rhodes, Knightstown, Ind.

Controlling Flush-Tank Ball Valve

If the lift wires of the ball valve in a flush tank are wired together, overflowing of a toilet bowl is stopped by a quick twist of the flushing handle. In addition to permitting emergency seating of the valve without raising the tank cover, this positive control allows the bowl to be completely filled without overflowing. In many cases, filling the bowl will permit freeing a clogged drain by water pressure alone.



Roy G. Loughary, Portland, Ore.

Staples Hold Sign Cloth Taut And Are Easy to Remove



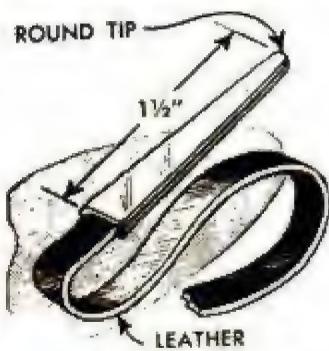
When lettering large cloth signs, one artist found that office staples were better than thumbtacks to hold the cloth stretched tautly. To remove the staples rapidly, a length of stout fishline is placed under them as they are driven. A quick jerk on the line will then pull out the staples.

G. E. Hendrickson, Argyle, Wis.

Weatherproofing Summer Cottages

Loose-fitting window frames and cracks in the siding and floors of summer cottages can be made windproof and weatherproof by using boat-calking compound to seal the openings. The compound can be applied with a calking gun, a knife, or, in an emergency, with a thin, flat stick that is somewhat pliable.

Lacing Tip for Leather Thong Fashioned From Tin Can



Using a piece of metal cut from a tin can, this leather-lacing needle is made in a jiffy and costs absolutely nothing. After cutting a piece $1\frac{1}{2}$ in. square from the side of a tin can, bend the metal

double and flatten the bend with a hammer. Then trim the edges of the metal to shape with tinner's snips. Finally, file the edges smooth and round the tip. To attach the needle to the end of the lace, pry the metal edges apart with a knife, insert the lace and squeeze the needle together with a pair of

pliers. If necessary, tap lightly with a hammer to tighten the grip and use a razor blade to trim excess lacing from the edges of the needle.—Gerald W. Hall, Mentor-on-the-Lake, Ohio.

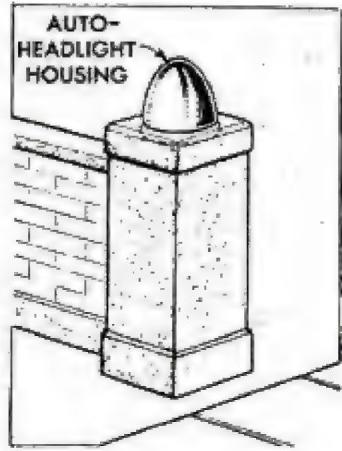
Lacquer Protects Drawings

To keep plans and working drawings from tearing easily, one craftsman glues them to pieces of cheesecloth and coats them with clear shellac or lacquer.

Neal Houlahan, Glenshaw, Pa.

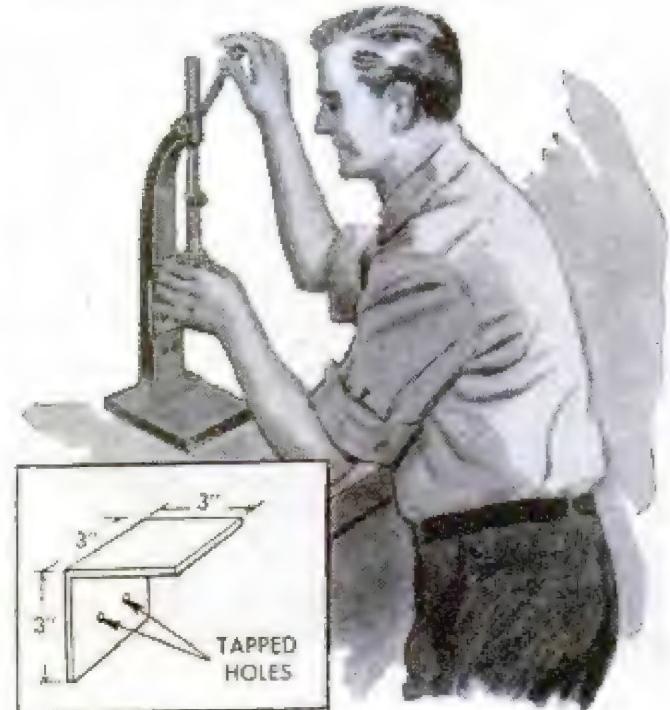
Ornamenting Driveway Gateposts

Discarded lamp housings from older types of cars make novel ornaments for the tops of driveway gateposts. Each housing is painted as desired and its rim embedded in a coating of mortar on top of the post.
— Willard Midby, Billings, Mont.

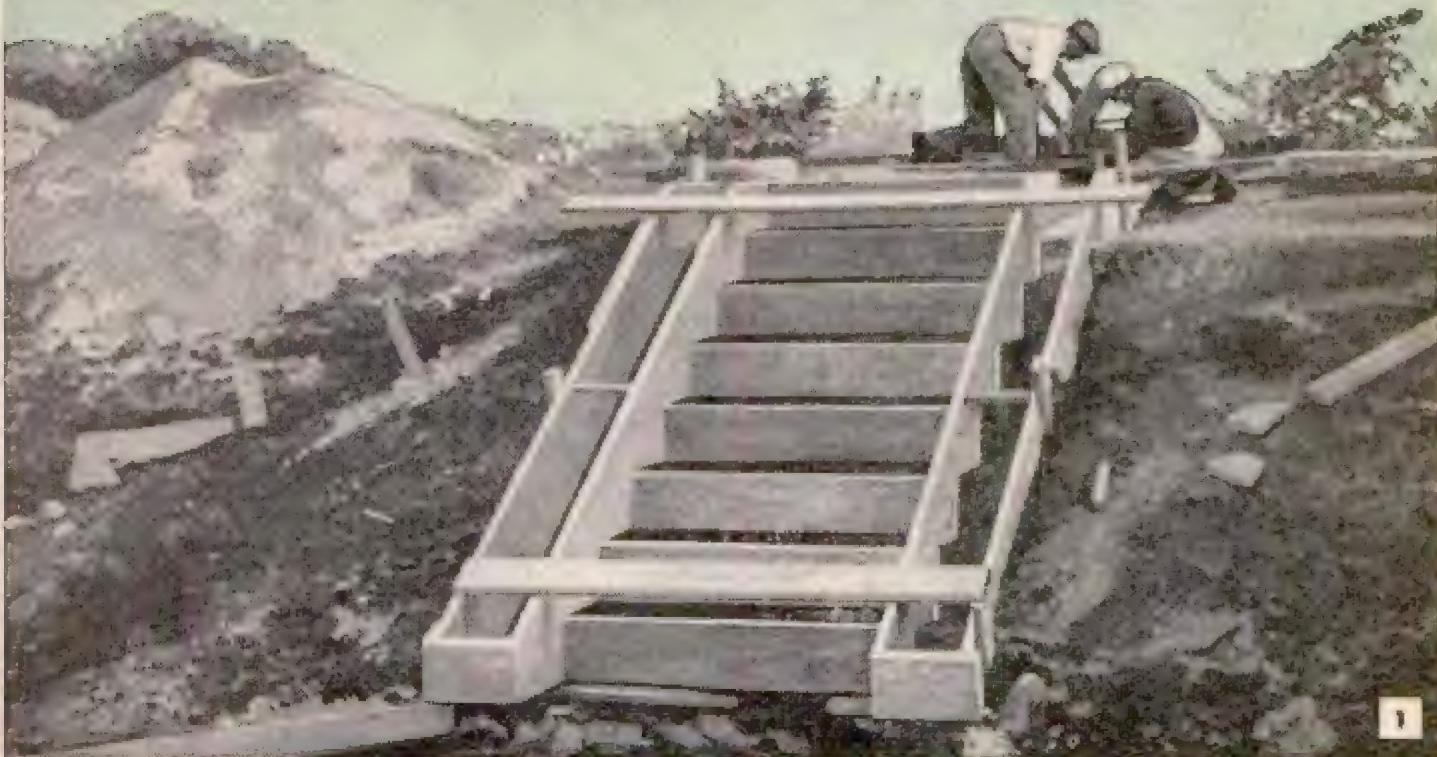


Home-Workshop Arbor Press Utilizes Bottle Capper

By fitting a bottle capper with an adjustable table, one home craftsman made a handy arbor press for light work. He used a piece of 3-in. angle iron for the table, drilling and tapping it for two bolts. Then, he drilled a series of corresponding holes along the front of the T-shaped upright of the bottle capper to permit fastening the table at several different heights.



STEPS IN CONCRETE



Photos courtesy Portland Cement Association

By Thomas Trail

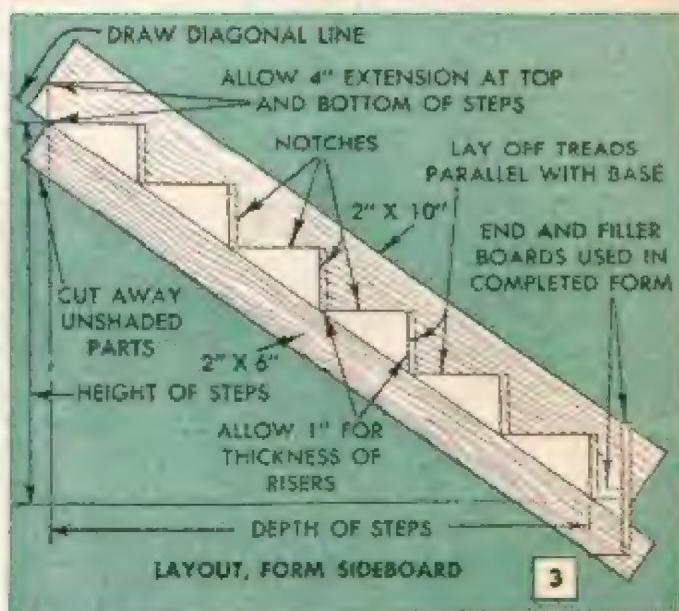
CAST-CONCRETE steps add measurable values to any home, and welcome savings in first cost can be had by doing the whole job yourself, from setting the wooden forms to mixing and pouring the concrete. Only the simplest hand tools, such as a hammer, saw, and a good level, are needed for building the necessary forms, and the lumber and materials are available from any building-materials dealer.

The first step in setting the forms is preparing the ground over which the steps are to be cast. If the soil is well-drained and contains gravel and sand in relatively small amounts, about all that is necessary is to level and tamp the area thoroughly to compact the soil. On the other hand, if the soil is a heavy, tight clay through which drainage of surface water is slow in wet seasons, it will be necessary to excavate to a depth of 6 to 8 in. below grade and put in a tamped-gravel fill. Thorough tamping of the fill is of the first importance. Make a tamper by cutting an 18-in. length from a 6 x 8-in. timber and nail a 36-in. strip to each side to provide handles. Go over the whole area of the gravel fill with the tamper several times in order to compact the fill uniformly. Cinders should never be used as a fill under a heavy concrete casting as they disintegrate in time.

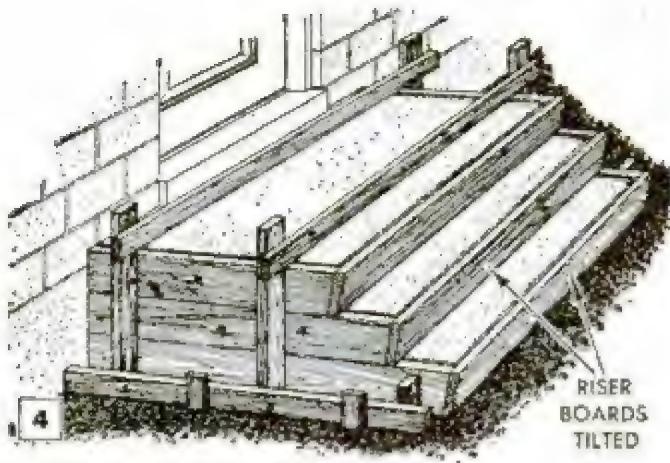
Fig. 1 pictures the form required to produce the type of terrace steps shown



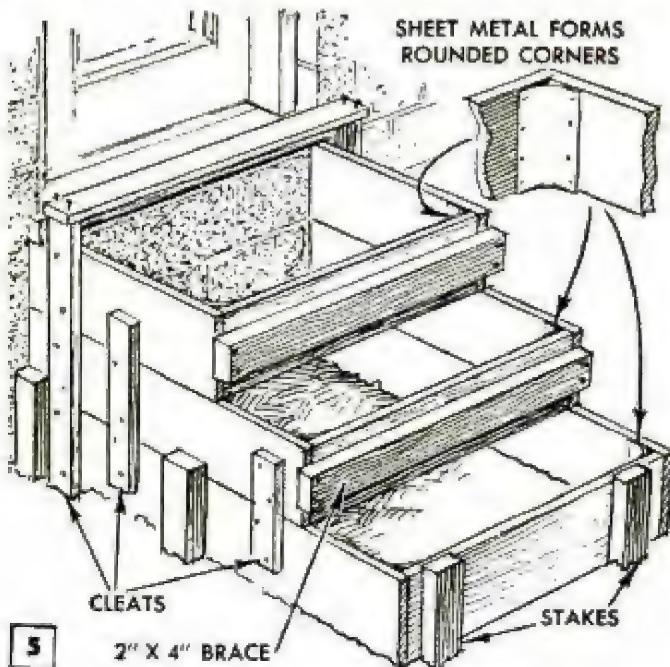
2



3



In this form, the riser boards are inclined at an angle of 5 deg. The purpose of this is to add to tread width without increasing the over-all dimensions



Braces, or stiffeners, usually are required to prevent springing of the riser boards under pressure of freshly poured concrete. Tie strips hold sides

in Fig. 2. Fig. 3 shows the method of laying out and cutting the form sideboards. Compare this with the simpler forms detailed in Figs. 4, 5 and 6. The form detailed in Fig. 6 gives the type of steps pictured in Fig. 8. To cover a given ground area, both types of forms require about the same amount of material per single step but the construction differs in some details. Note in Fig. 4 that the riser boards are inclined at an angle of about 5 deg. The purpose of this is to add to the actual tread width without increasing the over-all dimensions of the form. The inclination of the risers gives more toe room. In making this type of form, the risers should never be inclined more than 5 deg. The form in Fig. 4 is constructed for casting the steps, or stoop, considerably wider than the entrance doorframe. The smaller form in Fig. 5 has been made the width of the doorframe. In some types of stoops, this width may be necessary or desirable, but the general practice is to set the form to give a width that will extend from 6 to 18 in. on each side of the doorframe. This width allows plenty of room for installing an ornamental iron railing.

Lumber used for the forms should be smooth on one side and free from knot-holes. In addition to adequate staking, the boards should be well supported with braces and stiffeners to prevent bending under pressure when the concrete is poured. This is especially important where the width of the steps makes it necessary to use long riser boards. Braces, or stiffeners, of 2 x 4-in. stock should be nailed across the outer faces of all $\frac{3}{4}$ -in. riser boards more than 30 in. long and also across the face of 2-in. riser boards more

than 60 in. long. These braces or stiffeners, are shown in place in Figs. 5 and 6. When staking the first, or lower step form, use at least two stakes, Fig. 5, against the first riser board if it is 30 in. or less in length. If more, use three or four stakes. Tack the stakes to the board from the outside by driving the nails only part way in. The sideboards of forms like those in Figs. 5 and 6 are held together by means of cleats, at least two being required on each side, in addition to two or more stakes driven into the ground.

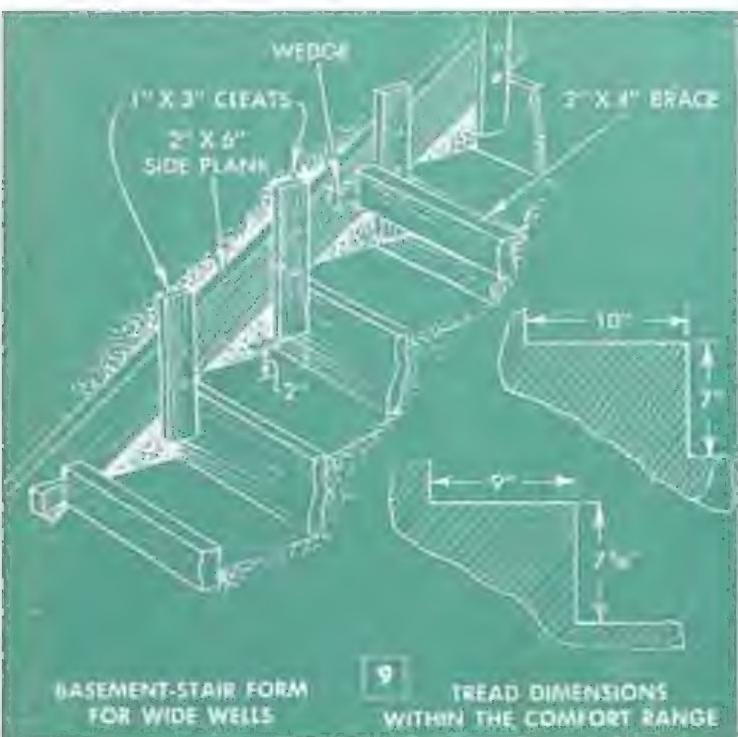
In Fig. 4, a somewhat different method of cleating and staking the sides of the form is shown. Here, the three sideboards are nailed to two 2 x 4-in. stakes previously located and driven at each side of the form. After plumbing the assembled sideboards, tie strips are nailed to the projecting ends of the stakes to keep the form from spreading under pressure of the freshly poured concrete. Then a narrow board is tacked to the stakes at each side of the form and additional short stakes are driven outside this board as shown. In this way, the end members of a wide form cannot shift during the pouring. The 2 x 4-in. braces, Fig. 5, have been omitted from the form in Fig. 4 to show better the angle of the riser boards.

When concrete side walls are cast integrally with the steps, Figs. 1 and 2, each step is reinforced with a $\frac{1}{2}$ -in. steel reinforcing bar which is placed in the step as the concrete is poured. The bar should be cut to such length that it extends beyond the ends of the step a distance equal to about half the thickness of the side walls. These bars prevent the side walls from cracking away from the steps.



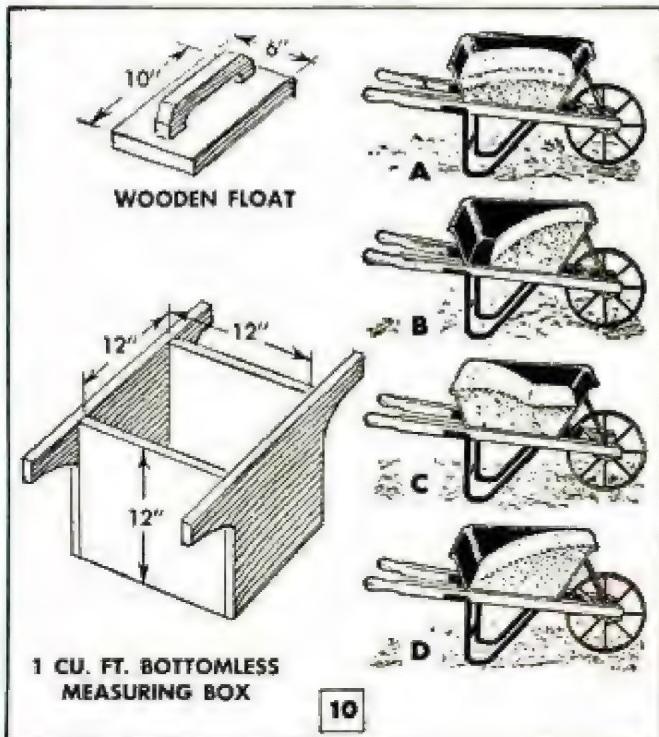
8

Figs. 7 and 9 detail methods of setting forms for basement stairs. Where the stair well is already formed with concrete walls, the stair forms are simply riser boards spaced, plumbed and wedged between the walls. The earth fill is tamped to a uniform slope. When the steps are wider than normal, it is necessary to fit side planks and vertical cleats so that the riser boards may be supported by horizontal braces which are wedged against the side planks, as in Fig. 9. Be careful in laying out and setting forms for basement stairs to keep the tread-to-riser proportions within the accepted comfort range, as in the right-hand details of Fig. 9. These dimensions



9

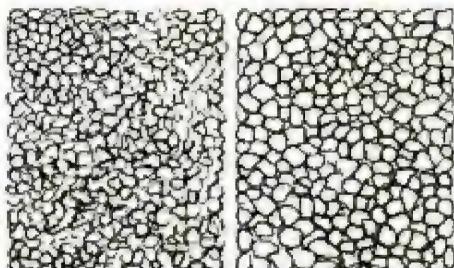
TREAD DIMENSIONS
WITHIN THE COMFORT RANGE



10

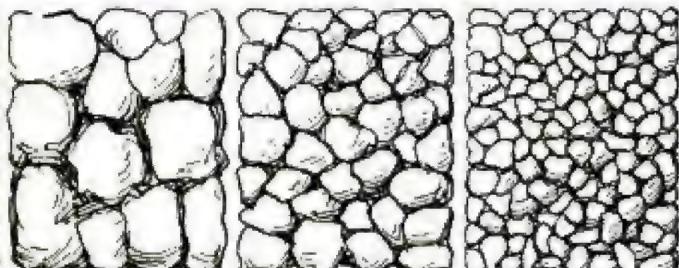


11



12

Clean, sharp sand of the quality used for concrete work should have fine, medium and large particles mixed in about equal proportions for the best results

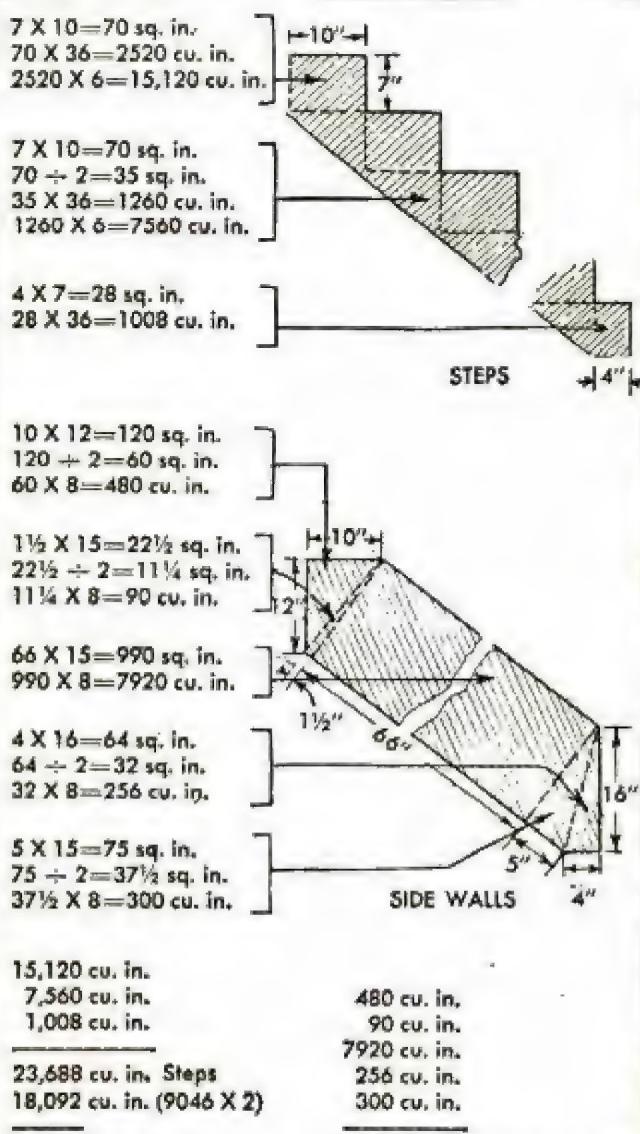


The largest pebbles of the gravel should not exceed 1 1/2 in. in size. Concrete mix should contain very nearly equal quantities of large, medium and fine pebbles

13

HOW TO FIGURE CUBIC VOLUME OF STEPS

Example: Six steps 36 in. wide, 7-in. riser and 10-in. tread, with 8-in. side walls.



Total volume in cu. ins. $41,780 \div 1728$ (cubic ins. per one cu. ft.) = 24 cu. ft., approx.

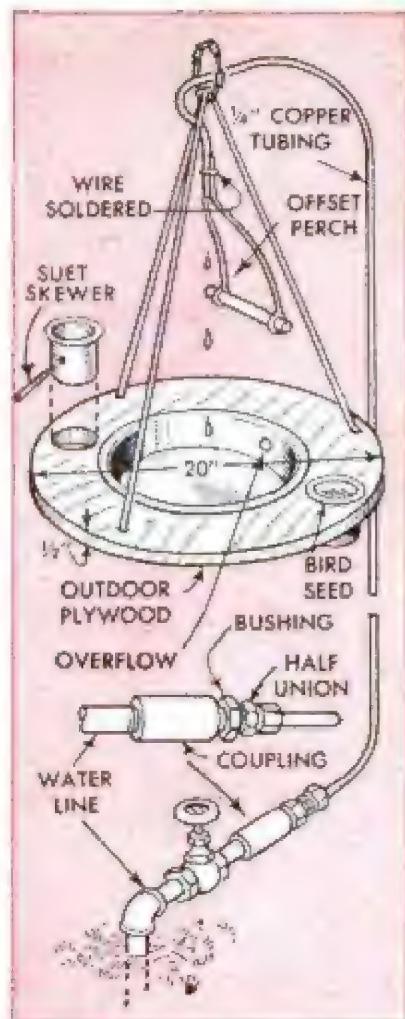
also apply when building forms for other types of steps.

On small jobs, concrete may be mixed by hand methods but, where several yards are required for a single pouring, it is better to rent a mixer or purchase concrete ready-mixed to specifications. In hand-mixing, make a bottomless box, Fig. 10, for measuring the amounts of gravel, sand and cement. The box holds 1 cu. ft. of dry material if made according to the dimensions. One good way of mixing is to shovel the measured materials into a wheelbarrow. Mix the dry materials as in steps A and B, Fig. 10. Add the proper amount of clean water, step C, and mix thoroughly, step D. Once the pouring is begun, continue until the job is finished. As soon as pouring is finished, level the concrete flush with the top of the forms with a wooden float, Fig. 10. Wait until the concrete stiffens slightly before troweling. Edges of the treads and other parts of the concrete work are rounded by running an edging tool along the top edges of the forms. Cover the concrete with wet sacks or straw and keep the covering damp for several days after pouring to aid in proper curing.

The largest size of gravel used in the concrete mix for pouring the average entrance steps should not exceed 2 in. in diameter, Fig. 11. Smaller average sizes are better. The average proportions of the sand and gravel sizes are shown in Fig. 12. The table, Fig. 13, shows how to estimate in detail the amount of concrete required for steps and side walls. If the aggregate (sand and gravel) is only slightly damp, use $5\frac{1}{2}$ gal. of water per sack of cement when mixing. If the aggregate is quite wet, use only 4 to $4\frac{1}{2}$ gal. of water per sack. Use of the correct amount of water is important.

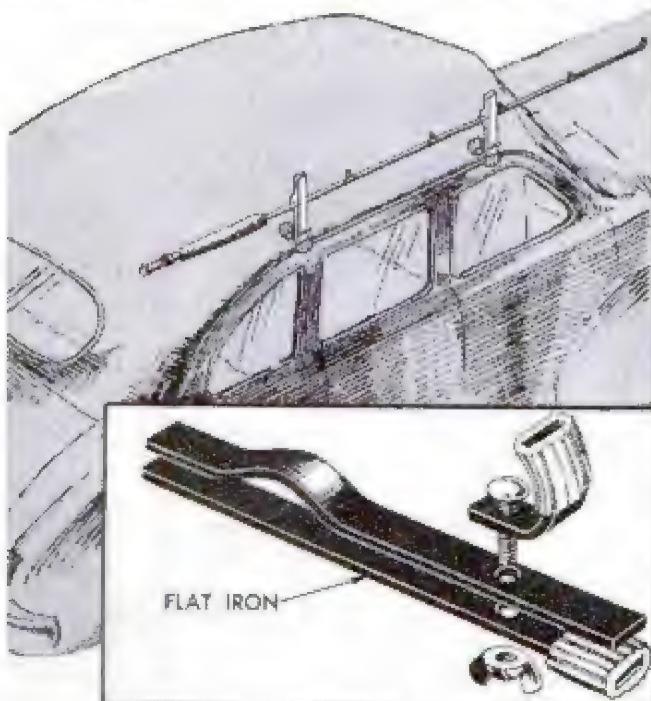
Attractive in its simplicity, this combination birdbath and feeder will be a great favorite with your feathered friends. The unit is suspended from a tree limb with wire or chain and the bath features running water which drips from an overhead outlet. Water is piped to the bath by means of a length of copper tubing stapled to the tree trunk and along the underside of the limb. The lower end of the tubing is connected to the water line as shown, the valve being adjusted for a steady drip. A metal pan for the bath and two cups, one for feed and the other for suet, are set in a circular plywood platform. A hole for an overflow is drilled through the side of the pan just under the platform, and the suet cup is fitted with a skewer to hold the suet cake in place. Another novel feature of this unit is an offset perch made from two pieces of stiff wire and a length of dowel. This is soldered to the end of the copper tubing to permit the birds to catch the water as it drips from the outlet. The copper tubing is painted to match the bark of the tree, and

Running Water Piped Up Tree Trunk Supplies Hanging Birdbath and Feeder



the undersides of the platform, pan and cups are painted the same shade except in a mottled effect to blend with the tree foliage.—Hi Sibley, Nuevo, Calif.

Convenient Car-Top Carrier for Long Fish Pole Clamps to Drip Molding



As my favorite fish pole is too long to be carried inside my car, I made this handy car-top carrier for the pole. It consists of two flat-iron holders, tightened with wing nuts, which clamp to the drip molding of the car. Pieces of rubber tubing pressed over the ends of the holders protect the car finish from being marred by the metal.

Claude W. Clifford, Portland, Ore.

Ignition Contacts on Model Airplane Provided by Dress Snaps

Ignition systems of gas-model airplanes are not likely to fail because of broken contacts if ordinary dress snaps are soldered to the terminals and to the ends of the leads. In addition, use of the snaps permits the wiring to be disconnected quickly for replacing the various parts.

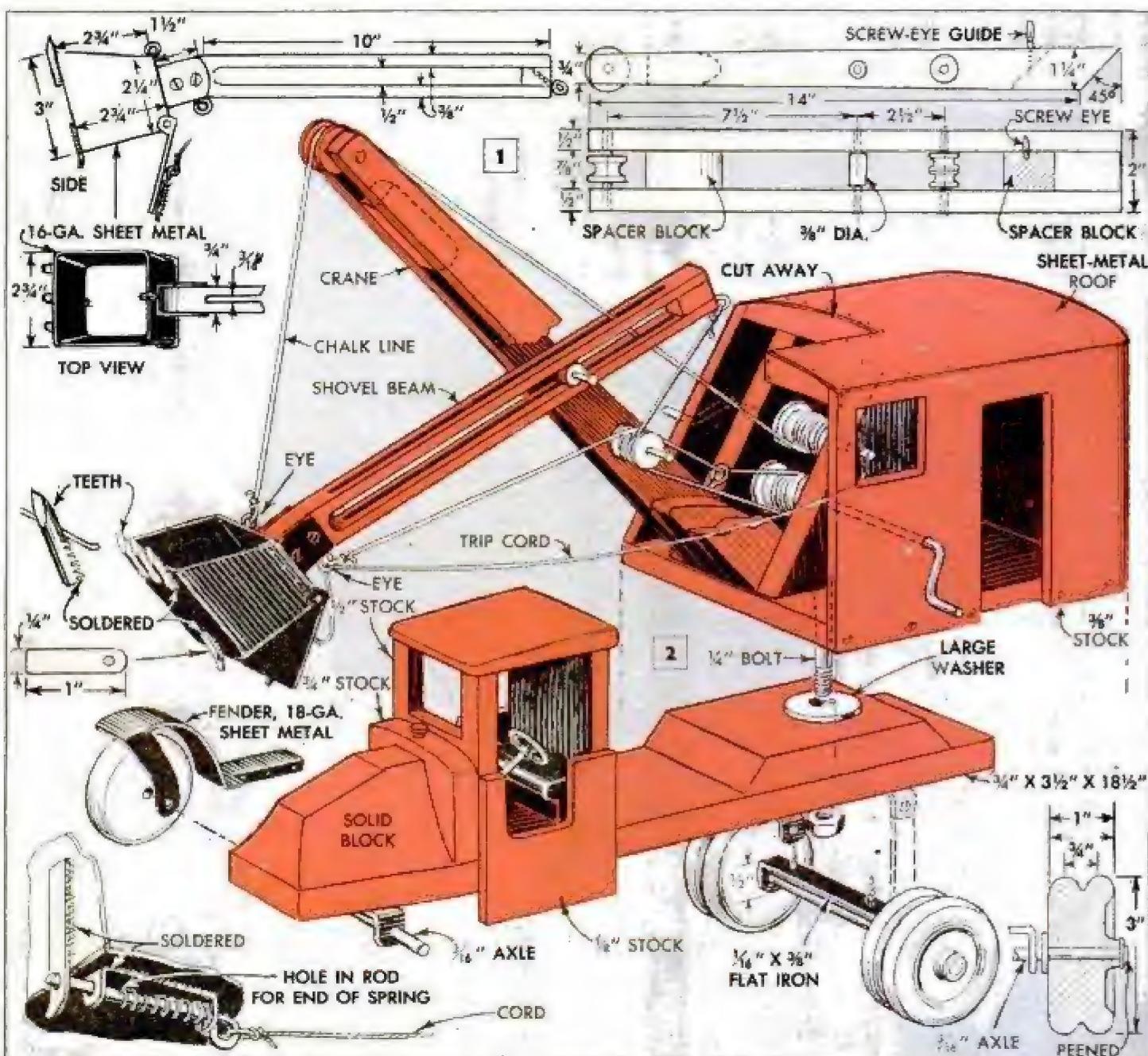
Fred M. Bowles, Annapolis, Md.

THIS TOY "STEAM SHOVEL"

YOUNG engineers will have hours of fun with this sturdy model of a full-size steam shovel. It is realistic in design and principle of operation, and the cab and crane mounted on a truck chassis have a swivel base which permits swinging in a complete circle. Two hand cranks, one on each side of the cab, operate the shovel. The bottom of the shovel is hinged, and the load is dumped by pulling a trip cord extending back to the cab. Sand or loose soil is easily scooped from one spot and dumped in another or into a toy truck. Size of excavation is limited only by the swing of the crane and travel of the shovel beam.

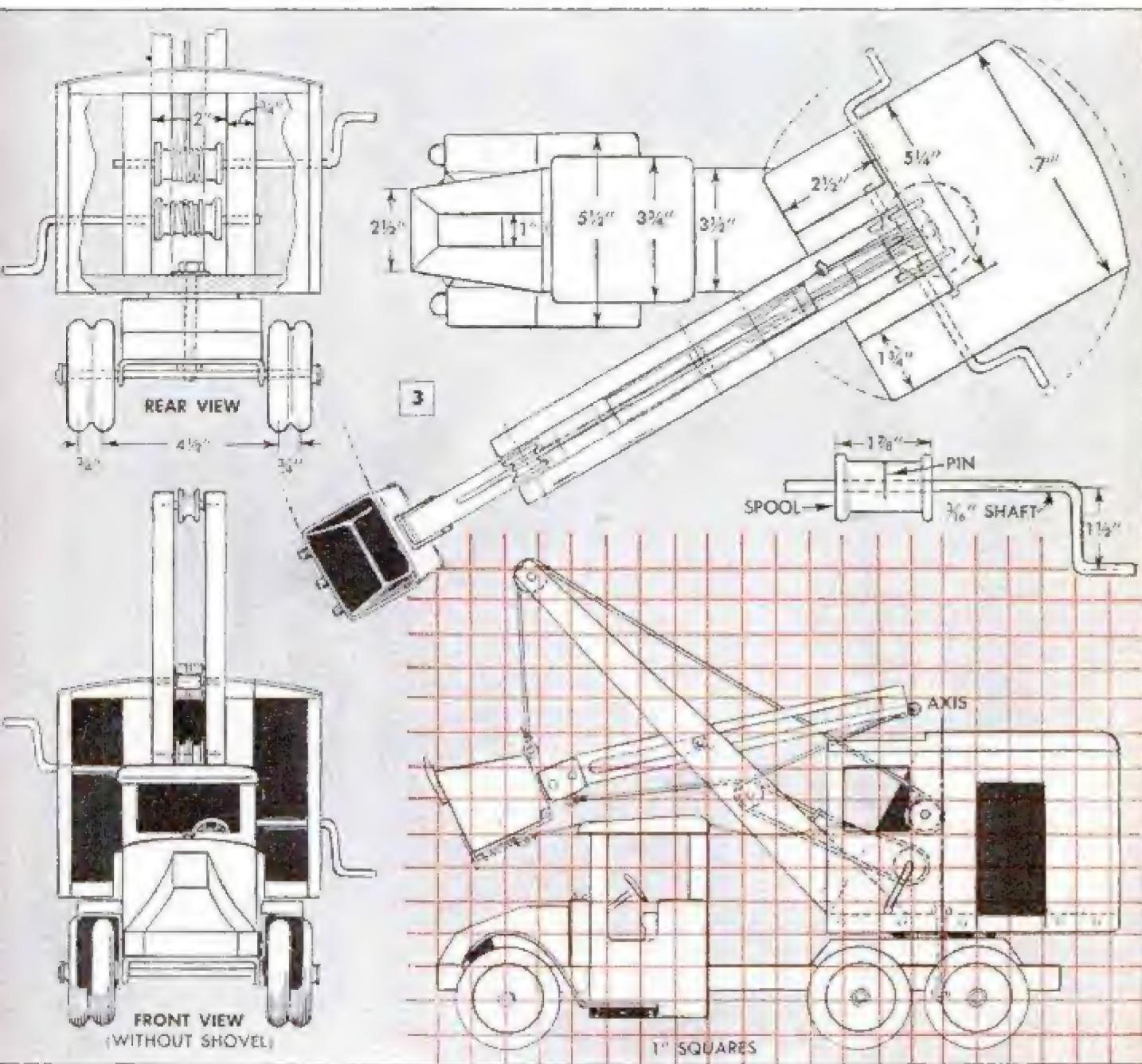
The crane, Fig. 1, consists of two parallel members with spacer blocks, sheaves, and a roller between them. Note that the lower sheave has a double groove, a screw eye guiding the cord in one of the grooves. The

shovel beam has two slots, one for the roller of the crane and the other for the lifting cord. For durability, the shovel is made of sheet metal. Three teeth ground to flat, sharp points are soldered to the cutting edge of the shovel as shown in Fig. 2. Details of the latch are given in the lower left-hand detail. The truck chassis and cab are made of wood to the dimensions indicated in the side, top, and end views of Fig. 3, and are assembled as in Fig. 2. The rear wall of the cab is made of 1-in. stock planed to a curve and the roof is sheet metal. Four dual wheels are used on the rear of the truck chassis and two single-tired wheels on the front. These are turned to the dimensions given in the sectional view, Fig. 2, and drilled for a tight fit on the $\frac{3}{16}$ -in. axle. Use hardwood, such as maple, for both the front and rear wheels. The winches



REALLY DIGS

are wooden spools pinned to $\frac{1}{16}$ -in. shafts bent to form crank handles. The upper winch raises and lowers the shovel while the lower winch moves the shovel back and forth. Controlling cords are arranged as shown in Fig. 2. After assembling, sandpaper all wooden parts to get a smooth surface over which to apply paint. The shovel, tires, cab roof and front fenders are painted black and all other parts a bright red or yellow. Use a durable, outdoor enamel for the final coat as the finish will get hard usage.



Flower Trellis From Porch Gate Is Set Up in a Jiffy



If you have an old porch gate, it will provide an attractive flower trellis that can be folded and stored during the winter. Just extend the gate to the desired height and attach it with screws to a post or the side of a building so it is easily removed. If set up against a building, use wooden spacers to hold it away from the siding.

Byron L. Troyer, La Fontaine, Ind.

Record Album Holds Saw Blades For Convenient Storage

Circular-saw blades are stored conveniently and safely by inserting them in the envelopes of a phonograph-record album.

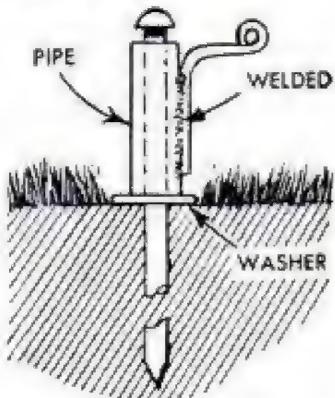


If each envelope is labeled according to the type of blade it contains, blade selection can be made quickly.

Benj. Nielsen, Aurora, Neb.

Dog Tethered to Swivel Post

Ideal for tethering a dog in the back yard, this swivel post is easily moved and the swivel prevents the dog from wrapping the tether around the stake. The stake is merely a length of pipe or rod pointed at one end for driving into the ground. A piece of thin iron rod, bent to shape and welded to a short length of pipe, is placed over the stake to provide the swivel. A washer under the swivel keeps it from working into the ground, and the top of the stake is peened over to prevent the swivel from slipping off. The swivel pipe should be large enough to rotate freely on the stake.

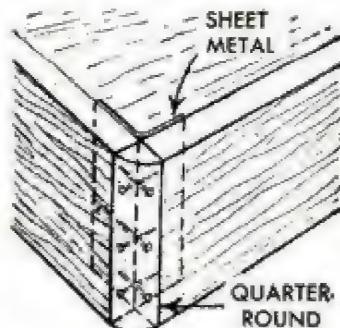


160 W. P.

Round-Cornered Wooden Boxes

When making wooden boxes, such as flower boxes, that must present a good appearance, use pieces of quarter round to provide neat-looking rounded corners. Try to use quarter round of the same thickness as the sides of the box and, if necessary, reinforce the inside of the corner with sheet metal.

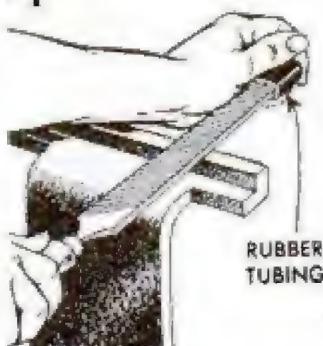
Herbert E. Fey, New Braunfels, Tex.



Rubber Tubing on Tip of File Provides Finger Grip

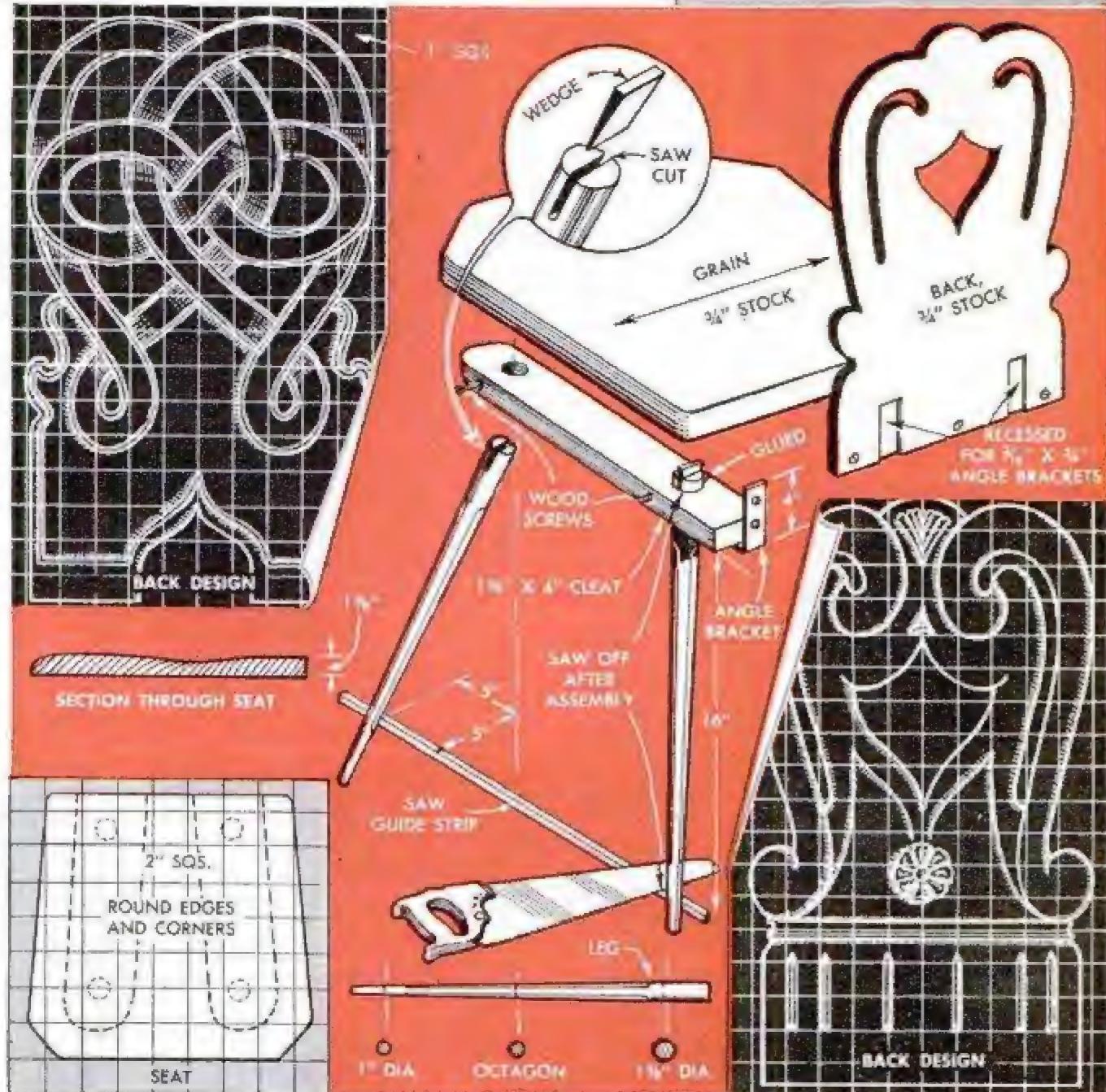
A small section of heavy rubber tubing or hose pressed over the tip of a file provides a comfortable finger grip. This is especially useful to protect the fingers when filing for a long period of time. Use hose or tubing of a size that fits tightly over the tip of the file.

Clifford T. Bower, Decatur, Pa.



Alsatian Chairs

THESE continental chairs with their widely splayed legs and attractive, carved backs are worthy projects for the home craftsman and provide distinctive pieces for a hall or dining room. Although each chair back appears difficult to make, actually it is fairly simple because the design first is cut through by scrollsawing. Either of the back designs is cut from a single panel, and the scrolled section finished in low relief with a chisel, veining tool and sandpaper. The seat is mounted on two cleats bored approximately 15 deg. from the vertical for insertion of the legs. The top ends of the legs are saw-cut to receive a wedge driven at right angles to the grain of the cleat. The top edges of the seat are rounded and, by using material $1\frac{1}{8}$ in. thick, the seat can be hollowed to form a concave section for greater comfort. In assembling, the back is fastened to the cleats with angle brackets which are recessed flush. Either antique or natural finish, waxed and rubbed to a soft luster, is suitable for this type of chair.

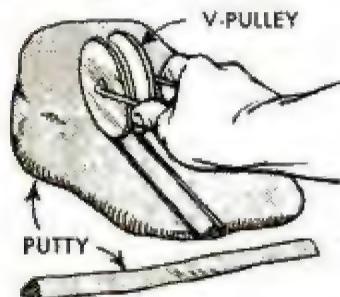




Nonsplash Water Test Tank Checks Outboard Motors

An empty 55-gal. oil drum provides an ideal tank for testing outboard motors in water and, if the top of the drum is cut out to form a flap, water will not splash out of the tank when the motor is operated at high speeds. When laying out the top of the drum for cutting, draw a straight line, 16 in. long, 10 in. in from the rim, centering it on the drum top. Then, at each end of this line draw a perpendicular line back to the rim. Using a cold chisel, cut out the top along the perpendiculars and along the rim. Then bend the resulting flap downward to form the opening.—Ed Packer, Chicago.

Pulley Cuts Glazing Putty



Glazing a window is done more quickly by an amateur if a small V-pulley is used to cut the putty into strips of the proper shape. An ordinary clothesline pulley is the

right size for the job. The putty is spread on a board with a rolling pin to the required thickness and cut as needed. The strips fit almost perfectly, requiring only slight pressure with a putty knife to press them in place.—Jeff Sterns, New Bedford, Mass.

Prevent breaking the agate guides of a fishing rod by inserting small corks in them before putting the rod in its case.

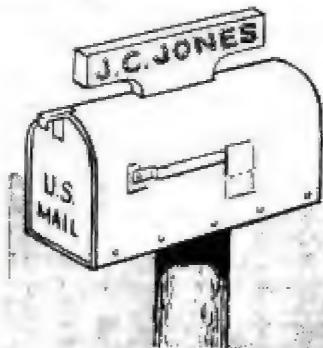
Tap Serves as Center Punch

Instead of discarding a worn or damaged tap, save it and use it as a center punch. As most small taps have a pointed tip, they can be used without grinding, but, if desired, an extra-sharp point can be ground on the end of the tap since the metal is extremely hard.



Name Plate on Rural Mailbox Is Lettered With Thumbtacks

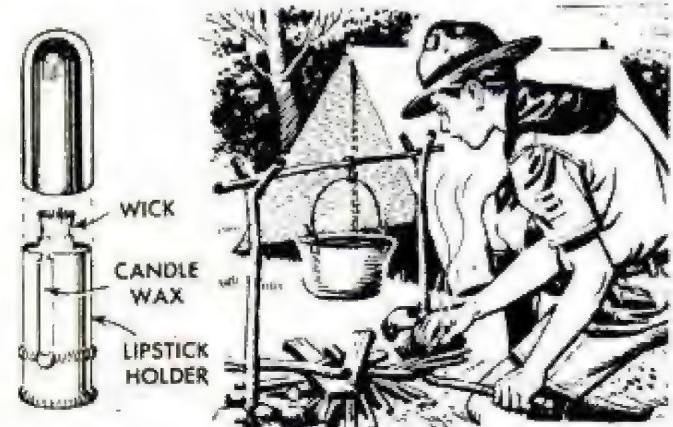
One farmer made a novel and easily read name plate for his mailbox by pressing thumbtacks into a piece of wood. After the wood is cut to shape and painted, the letters are roughly sketched on it. Then, the thumbtacks are pressed into the wood to form the letters. The wood, of course, should be painted dark to contrast with the heads of the tacks.

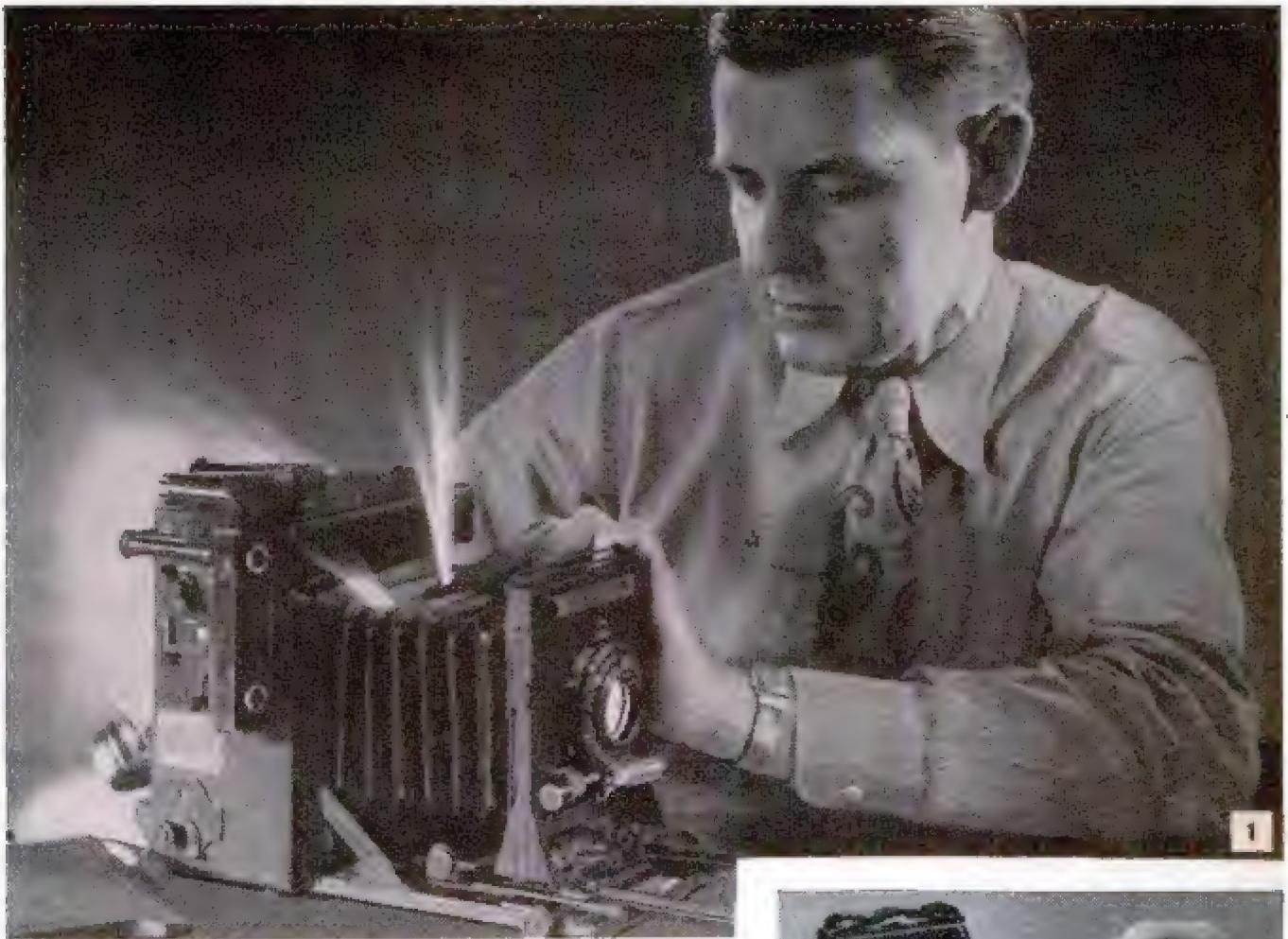


Torch for Lighting Campfires Contained in Lipstick Holder

Just the thing for lighting campfires without wasting matches, this little torch contained in a lipstick holder is easily carried in a pocket. In addition, the cap of the holder keeps the wick dry even in the wettest weather. Either shape a candle to fit or wrap paper or tape around the holder to cover the slot and fill it with melted wax. Insert a wick in the wax before it has had time to harden.

Elmer A. Anderson, Prairie du Sac, Wis.





1

Close-ups on **CAMERA CARE**

By Richard W. Emery

EVERY photo fan dreams of that once-in-a-life-time shot. Getting it for the album calls for quick action and a camera and accessories in top-notch working condition. Some camera parts, such as the lens mechanism and the focal-plane shutter, are made with watchlike precision and their performance is affected by dust, dampness and extremes of heat and cold. Low temperatures tend to slow down the exposure speeds of between-the-lens shutters and also shutters of the curtain, or focal-plane, type. Fine dust works its way into the shutter mechanism in time and affects reliable operation. Dampness (condensation) has a slow, corrosive action on metal parts, especially near the seashore. However, good outdoor pictures are wherever you find them and frequently the exposure must be made in adverse weather conditions.

To protect the lens from damage during outdoor work under difficult conditions, keep it covered with a lens cap at all times when not in use. If the camera gets wet in a rainstorm, wipe all the parts as dry as possible and leave it open in a protected place until thoroughly dry. If you must leave the



2

To clean a camera, first loosen dust with a soft brush as above. Then blow off dust and lint with a syringe as shown below



3



4

For cleaning interior surfaces of cameras, use lens-cleaning tissue dampened with carbon tetrachloride

camera in a car parked in the sun during a hot day, wrap the camera in a coat or blanket to protect it from the extreme heat. When outdoors, the photographer should acquire the habit of carrying the camera either by the handle or hand strap or in a carrying case, rather than carrying it loosely in the hand as it may be dropped and damaged. Small cameras of the candid type should always be carried in a heavy leather case provided with a neck strap. After purchasing a camera, carefully study the manufacturer's instructions for its care and use. Mechanical misuse should be avoided, especially when operating the newer types of shutters. As an example, never cock a Compur shutter when it is

A light leak in the bellows can be temporarily repaired by covering the hole with black gummed tape



5

To locate a light leak, press a flashlight against inside corners of bellows and inspect outer surface

set for time or bulb exposure and avoid changing from a fast shutter setting to the time or bulb setting when the shutter is cocked. Cover the lens and release the shutter before changing the setting. Avoid touching the surface of the lens with your fingers, as this may leave a smudge or a fingerprint that will spoil a good picture.

Periodic cleaning and inspection assure reliable performance. A thorough dusting of all the parts is the first step. For dusting, use a soft camel's-hair brush especially made for the purpose, Fig. 2. With this brush, you can get into the difficult corners both inside and outside. After loosening the dust with the brush, blow it clear with a rubber syringe as in Fig. 3. Don't

After pressing tape down smoothly around the hole, crease it to conform to accordion folds of bellows



6



7



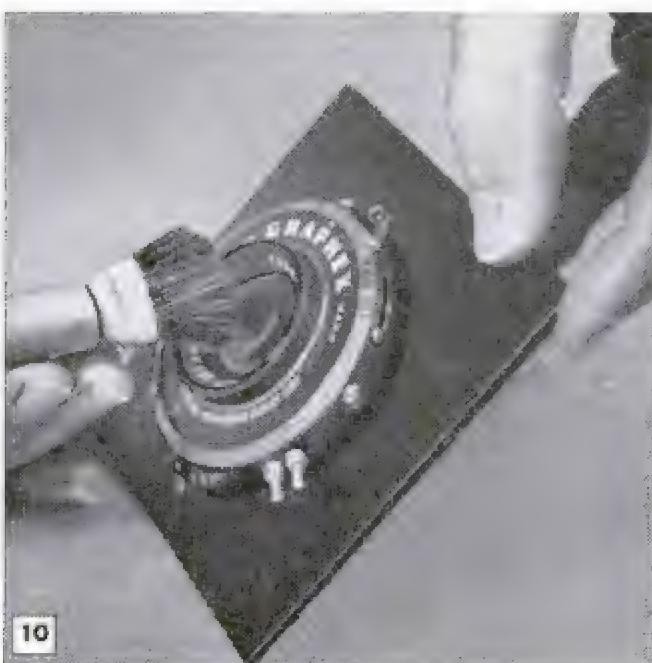
8

Torn covering can be replaced with household cement. First coat both surfaces, then press them together

blow the dust away with the breath as this deposits moisture on the metal parts. The focusing racks and pinions on both folding cameras and view cameras should get special attention, as dust and abrasive grit tend to collect on these parts. The best cleaner is a small cloth swab dipped in carbon tetrachloride. Apply this liquid cleaner freely to flush away dirt and grit. In some cases, it will be necessary to dismantle parts of the camera in order to get at the racks. For drying and polishing interior metal surfaces, use a lens-cleaning tissue as in Fig. 4.

If the camera is of the extension-bellows type and has had considerable use, the bellows should be fully extended occasionally

Brushing the lens before polishing it will remove dust particles which may otherwise act as an abrasive



10



9

Leather dressing will make a worn camera look new. Use cream type which contains preservative and dye

and closely examined for light leaks. Proceed as in Figs. 1 and 5. The room should be darkened so that tell-tale pinpoints of light will be revealed by a careful exploration with a small flashlight. Usually light leaks first show up in the accordion folds of the bellows. Small leaks can be repaired temporarily by covering with black masking tape as in Figs. 6 and 7. Place a finger inside the bellows and flatten the fold so that the tape will adhere over the whole area. Then crease the tape as in Fig. 7, so that it conforms to the fold of the bellows. A somewhat better repair can be made in most cases by applying the tape to the inside of the bellows fold, but this procedure takes much more time and care. Don't rely

After brushing, place a drop of lens-cleaning fluid on center of the lens. Then polish with lens tissue



11



12

To polish the lens surface inside the camera, remove or open the camera back and compress the bellows



13

For a smooth sliding action, rub paraffin on sliding surfaces of film holders, above, and tripod, below



14



15

Reflectors can be kept clean and bright with carbon tetrachloride. Polish the surface with a soft cloth

on taping a bellows that is torn or badly worn. Get a new bellows.

In time, hard knocks and general outdoor wear cause scuffs and tears in the covering of the camera box, or case. The covering will probably be loosened at its edges. Coat the underside of the loosened edges with a quick-setting household cement as in Fig. 8. If the area to be re-cemented is fairly large, coat both surfaces with cement and then hold them tightly in contact for a few seconds. A good leather dressing, applied according to the manufacturer's directions, can make a weather-worn camera look like new. Use a dressing of the type containing both a preservative and dye. Apply with a soft cloth as in Fig. 9 and polish until dry.

Be especially careful when cleaning a lens to avoid scratching the soft glass. Brush away any fine dust particles with a soft camel's-hair brush as in Fig. 10, then polish with lens tissue dampened with a lens-cleaning fluid. Some photographers place a single drop of the special cleaning fluid in the center of the lens with a toothpick as in Fig. 11. Clean and polish both exposed surfaces of the lens, Fig. 12.

Camera accessories made of wood and having sliding surfaces such as those on the cut-film holder, Fig. 13, and the folding tripod, Fig. 14, will continue to work smoothly if the sliding surfaces are coated occasionally with paraffin. After coating these surfaces, brush away all the excess paraffin. If you have flash equipment, you'll get better pictures when the reflectors are kept bright and clean. Use silver polish on silver-plated reflectors. All others should be cleaned with carbon tetrachloride and polished with a soft cloth. If the cleaning fluid is kept in a bottle spray-



16

Electric terminals of flash equipment should be kept clean by burnishing with emery cloth



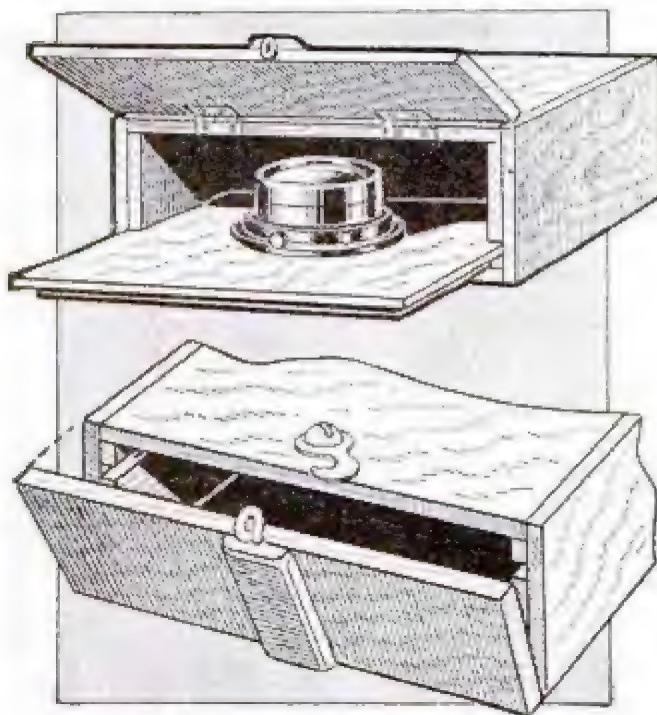
17

A weatherproof bag tailored to fit the camera and flash gun will afford protection from dust and driving rain

er, as in Fig. 15, the job is done quickly and easily. The electrical terminals of the flash system require periodic attention. Clean the corrosion off copper terminals with a fine polishing rouge or a fine emery cloth as in Fig. 16. Silver-plated terminals should be cleaned with a soft cloth dampened with carbon tetrachloride. When flash equipment is stored for any length of time, remove the batteries from their container and loop or coil the electrical cords so they do not become permanently kinked. The best protection for a camera in a sudden rainstorm is a waterproof bag of oiled silk or plastic, Fig. 17. For the greatest protec-

tion from dampness and dust, either when the camera is in storage or in intermittent use, the bag should be sewed with folded waterproof seams and provided with a handy drawstring which tightly closes the open end of the bag. Whether you buy or make a bag it should cover completely both camera and flash gun.

Plywood Case Protects Wide-Angle Lens From Dust and Damage



Having added a wide-angle lens to my camera equipment, I was faced with the problem of protecting it from dust and damage while carrying it in my camera case. I solved the problem by making a separate case for it from $\frac{1}{8}$ -in. plywood. The lens is held snugly by sliding the lens board in a groove in each side of the case. These grooves should be waxed so the lens board slides smoothly. Two thicknesses of plywood are used for each side of the case. The inner piece is of two parts which are glued to the outer piece to form the groove. The front of the case is fitted with a cover attached with small brass hinges and held in the closed position with a flat, brass S-hook and a brass screw eye. Although I finished the case by merely applying a couple of coats of wax to the wood, it can be stained and varnished or painted to match the camera case.

Walter Fischman, Philadelphia, Pa.

Condition of Flash Bulb Checked With Neon Test Light



A small neon test light connected in series with a photoflash bulb will check the condition of the bulb without damaging it. When the tester circuit is plugged into the 110-volt line, the neon light will glow if the flash bulb is in good condition.

Opening Developer Containers



Photographic chemicals packaged in containers fitted with metal covers are easier to open with a lift-type can opener than by cutting off the tops with a knife. The can opener does the job more quickly and is safer to use.

Reminder for Darkroom Clock

When working with fine-grain developers which require comparatively long processing time, it is easy to forget the exact time the film should be removed from the solution unless an automatic timer is used. To eliminate guesswork when using a clock for timing, fasten a reminder hand to the face of the clock. It is simply a round cardboard backing to which a movable cardboard indicator is attached with a brass paper fastener. The backing is attached to the center of the clock-face with cellulose tape and the hand



is moved to the predetermined time. When the minute hand of the clock is directly under the indicator hand, it is time to remove the film. The reminder can be used similarly when fixing or washing.

Glass Rod Is Substitute Funnel

If a plastic or glass funnel is not at hand for transferring photo solutions from one container to another, try using a glass stirring rod as shown. The liquid will follow the rod into the container. If a stirring rod is not available, a rod-type thermometer may be used. In addition to the convenience of using a glass rod when a clean funnel is not handy, the rod is much easier to wash thoroughly than a funnel, thus avoiding contamination.



Alcohol Dries Sponges Quickly

In order to speed drying his sponges before packing them, one traveling photographer wrings out as much of the water as possible and then soaks the sponges in alcohol. Wrung out again, the sponges are soon dry enough to pack as the alcohol evaporates much more rapidly than water.

R. F. Donavan, Jersey City, N. J.



Tips of Tripod Legs Painted White To Minimize Accidents

To help prevent accidental tripping over the legs of a tripod, apply a coat of white paint to the rubber tips so they can be easily seen. White tire paint will provide a long-lasting coating. — Kenneth Murray, Colon, Mich.



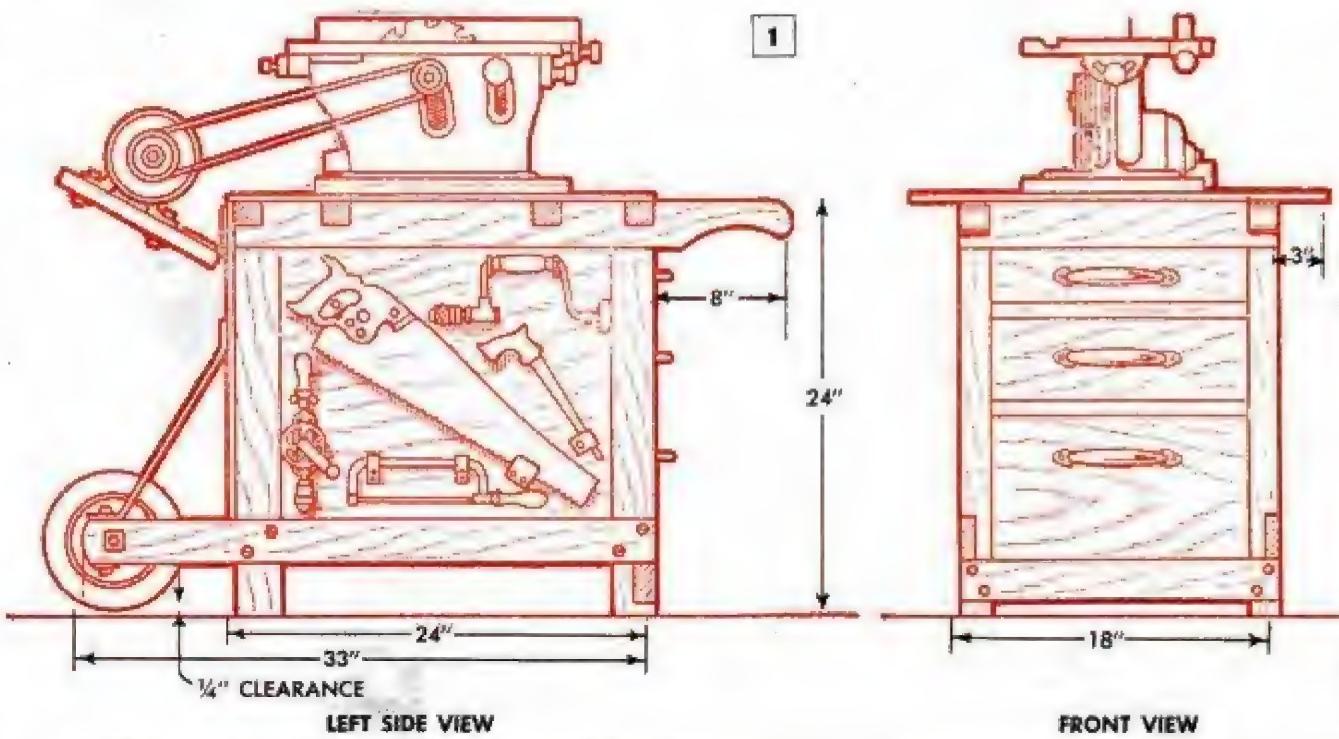


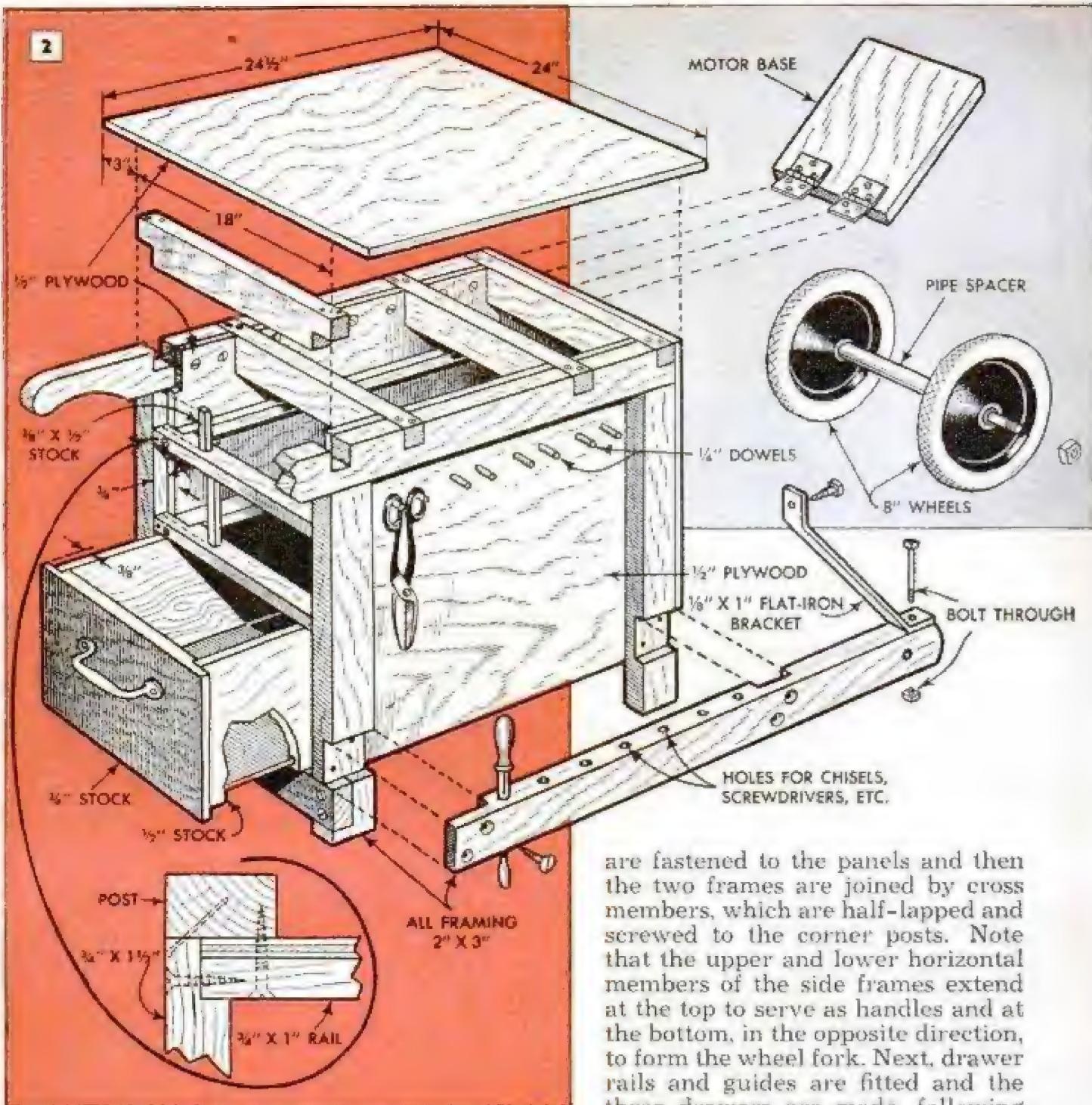
Portable

Bench-Saw Cabinet

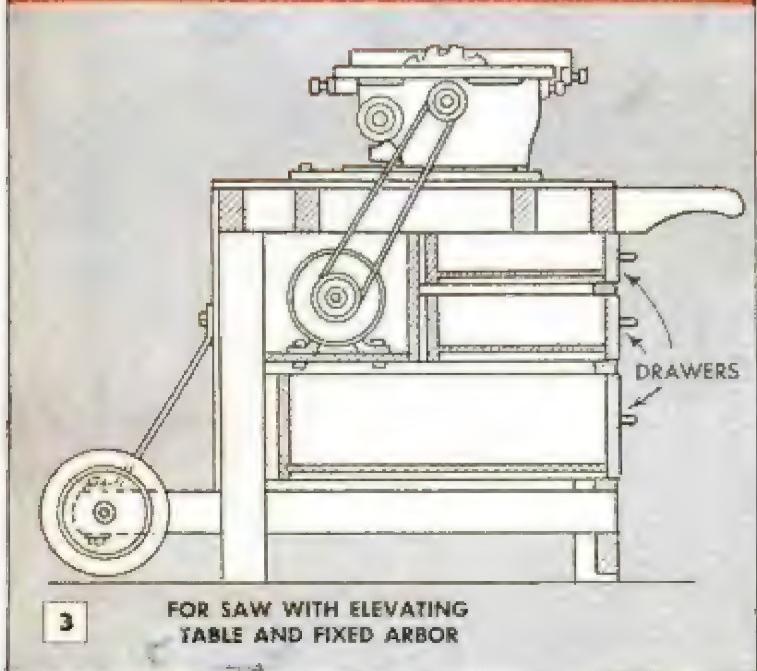
BY ADDING portability to a motor-driven bench saw, this wheelbarrow-type cabinet greatly increases its usefulness, especially in small home workshops where floor space is limited, or on a farm where it is sometimes more convenient to take the saw to the work. When long boards are to be ripped or crosscut, for example, the saw is easily moved so that the work will clear obstacles. In addition, the cabinet permits the saw and a supply of hand tools to be transported conveniently in a light truck or trailer.

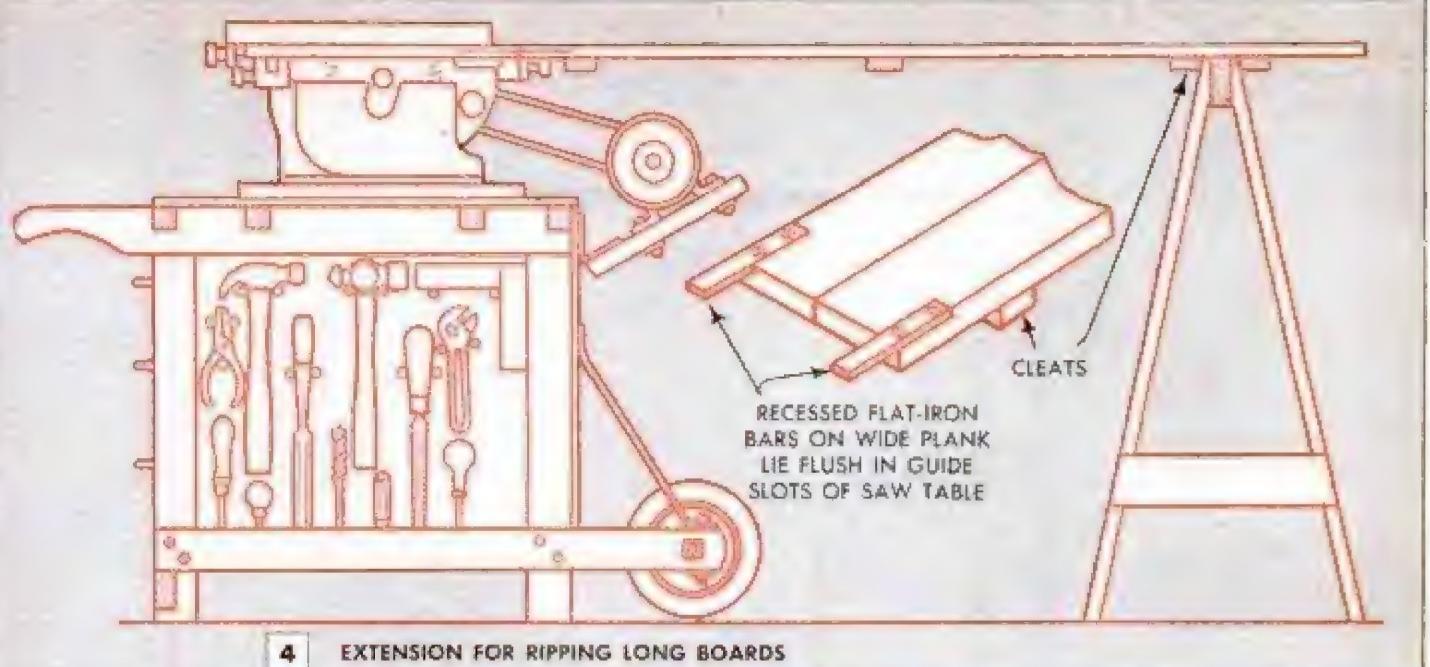
Fig. 1 gives the over-all dimensions and Fig. 2 shows how the cabinet is assembled. Side panels of $\frac{1}{2}$ -in. plywood are screwed to the inside face of the 2 x 3-in. frames. Drawer runners





are fastened to the panels and then the two frames are joined by cross members, which are half-lapped and screwed to the corner posts. Note that the upper and lower horizontal members of the side frames extend at the top to serve as handles and at the bottom, in the opposite direction, to form the wheel fork. Next, drawer rails and guides are fitted and the three drawers are made, following the type of construction detailed in Fig. 2. Drawer bottoms can be of $\frac{1}{4}$ -in. plywood unless the bottom is to support a heavy weight. If this is the case, use $\frac{1}{2}$ -in. plywood. The bottoms fit in grooves cut in the drawer sides and fronts, and ends of the drawer backs fit in dadoes cut in the sides. The wheel fork is strengthened with flat-iron brackets attached with bolts and screws as in Fig. 2. The 8-in. wheels are mounted on a single shaft with a pipe spacer between them. Threaded ends of the shaft pass through holes drilled in the frame members which form the wheel fork, and nuts turned on the threaded axle ends hold it in place. The plywood back is attached to the corner posts with screws and the





4 EXTENSION FOR RIPPING LONG BOARDS

plywood top is supported by cross members half-lapped into the horizontal members of the side frames. The recessed side panels provide space for storage of hand tools to meet ordinary needs.

If the bench saw is of the type in which the arbor raises and lowers a hinged motor base, Fig. 1, it is necessary to equalize belt tension. For saws with a fixed arbor and an elevating-type table, the motor may be located inside the cabinet on a fixed base as in Fig. 3. Where the motor is mounted in this way, the upper drawers are shortened to allow space for the motor and drive belt. If the base of the saw provides only for bottom discharge of the sawdust, the top drawer can be used as a receptacle. In this case, it may be necessary to provide a sheet-metal deflector at the back of the drawer compartment to prevent sawdust from dropping into the lower drawers.

When the saw must be used for ripping extra-long boards, an extension table, Fig. 4, comes in handy. This consists of two boards glued together or cleated edge-to-edge to attain the required width. The outer end of the extension table is supported on a sawhorse of the correct height to hold it level with the top of the saw

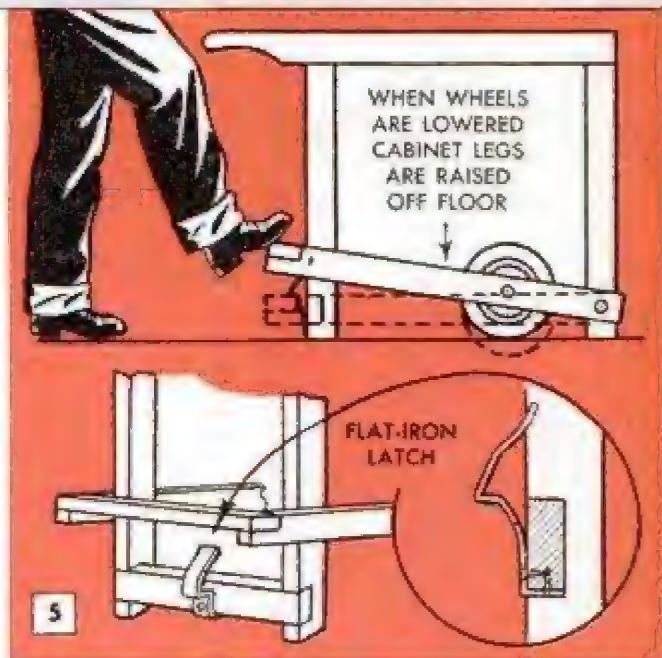


table. The opposite end of the extension is held flush with the edge of the saw table by two flat-iron bars recessed into the ends of the boards as in the detail, Fig. 4. The sectional size of the bars permits them to fit flush in the guide slots of the saw table. An alternate method of fitting the wheels is shown in Fig. 5. In this design, the wheels must be placed close to the balancing point.

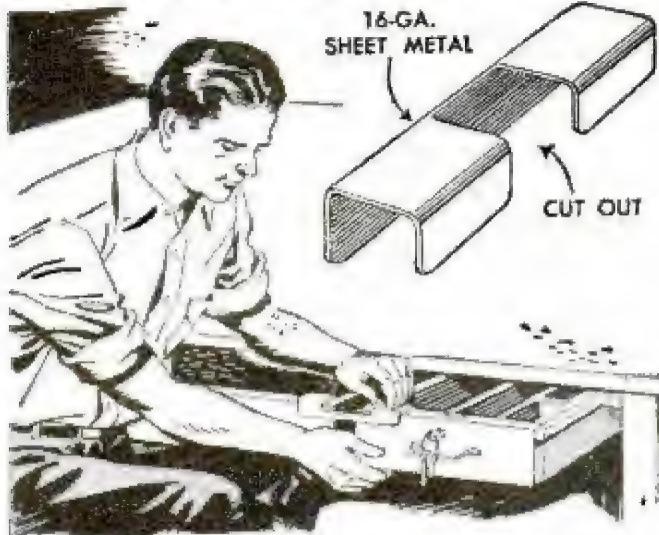
Accuracy of Carpenter's Level Easily Checked on Any Flat Surface

Because of the waste of time and money an inaccurate carpenter's level can cause, I always check the settings of a newly purchased level before using it on a job of any consequence. Naturally, the best way to do this is simply to lay the tool on a surface that is known to be level. However, the tool can be checked almost as easily on a surface that is not absolutely level. After selecting a flat, firm surface, I place the

tool on it and note exactly where the bubble settles in the level glass. Then, turning the tool end-for-end, I carefully take another reading. If the two readings are exactly the same, the tool is set accurately, but, if the readings vary, the level glass requires a corresponding adjustment. To check the setting of the plumb glass, I follow the same procedure, using a vertical surface.

Andrew Vena, Philadelphia, Pa.

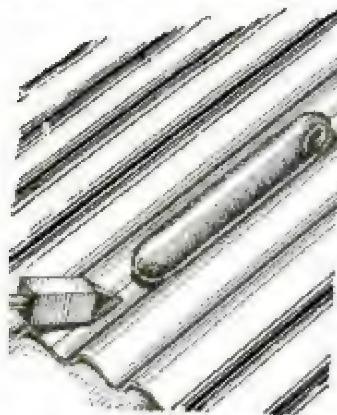
Metal "Bridge" Locks File Drawer In Large Drafting Table



As my drafting table is equipped with a lock on the right-hand drawer but none on the long file drawer, I made a sheet-metal bridge to hook over the two drawers. With the bridge in place, locking the right-hand drawer locks the file drawer also.

L. E. Reichenbaugh, Tulsa, Okla.

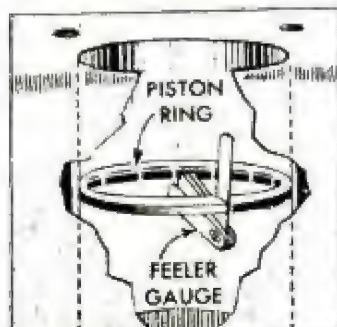
Sash Balance Weights Sheet Metal When Soldering Seam



To facilitate holding two pieces of corrugated metal while soldering them together, lap the seam and weight it with a sash balance laid in the groove formed by the corrugations. Slide it along as work progresses.

Checking Cylinder Wear

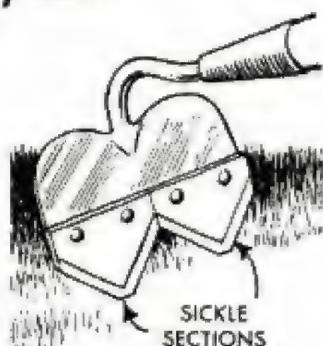
A piston ring and a feeler gauge are the only tools required to get a reasonably accurate check of cylinder wear on your car. As the ridge at the top of the cylinder does not wear, place the ring inside the cylinder at this point and measure the gap with the feeler gauge. Then move the ring down about 2 in. and again measure the gap. One third of the difference between these two figures is the approximate amount of wear in thousandths of an inch. If you want to be extremely accu-



rate, divide by 3.1416. To check the wear in the lower part of the cylinder, repeat the procedure 2 in. up from the bottom. However, the wear at this point likely will be considerably less than the wear at the upper part of the cylinder.

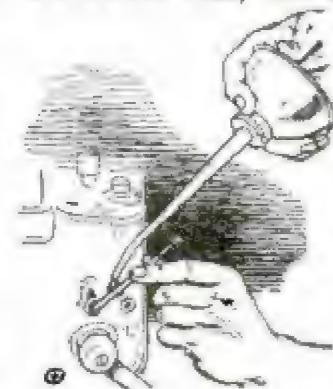
Sickle Sections Mounted on Hoe Adapt It for Rocky Soil

Unusually rocky soil is much easier to work if two sickle sections are riveted to the hoe. If equipment is available, welding the sections results in a more sturdy garden tool.



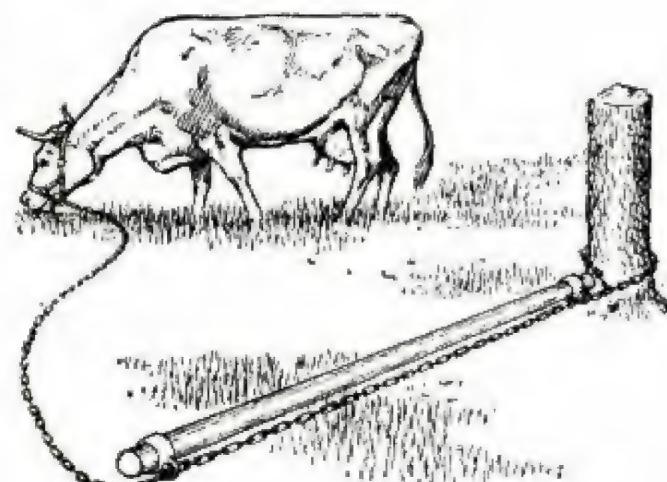
Oiling Ball-Valve Fittings

When oiling ball-valve fittings, the ball has a tendency to restrict the flow of oil from the can spout. To avoid this, use a nail or a piece of stiff wire to depress the valve and apply the oil to the nail. It will run down the nail to the fitting. This method, of course, also can be used to oil other hard-to-reach places of a similar nature.



Tether Attached to Long Pole Does Not Wrap Around Post

If an animal is tethered to a post for grazing, the tether can be kept from wrapping around the post by fastening it to a long pole as shown. The pole is pulled around the post by the animal and the full length of the tether is utilized.

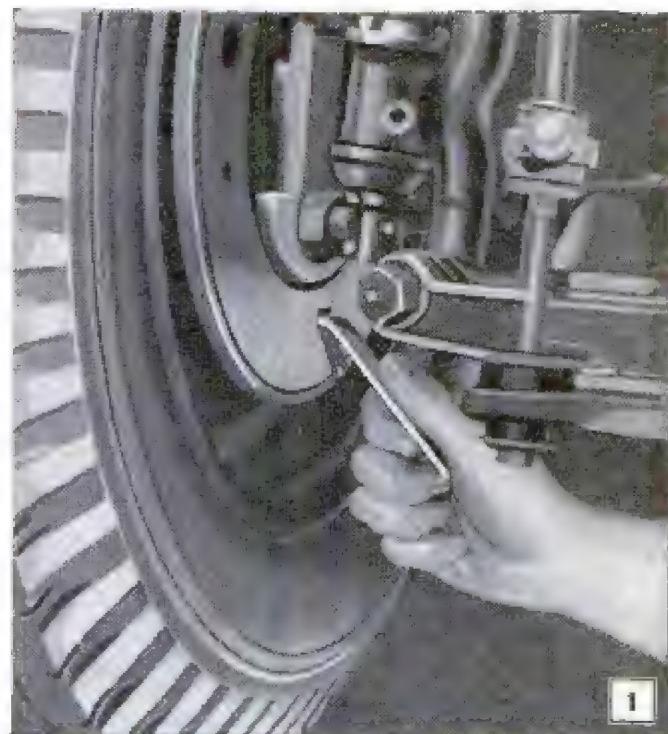


AUTO-BRAKE SERVICING

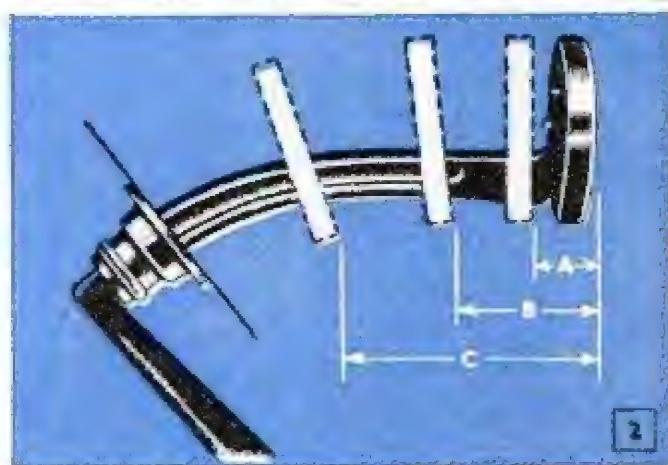
By Phil Ruskin

MODERN car-braking systems have been so simplified and standardized in construction that any car owner who likes to tinker can easily make ordinary repairs and adjustments himself. A simple adjustment of one or more of the four braking units, Fig. 1, renewal of shoes, adding fluid or bleeding air out of the system are usually all that is necessary. The most common symptoms of defects in the system are brakes that squeal on application, a "soft" pedal or a pedal that requires pumping in order to make a quick stop. Operation of the hydraulic service brake is quite simple and the parts are easily reached for servicing. When the brake pedal is depressed, a piston in the main, or master, cylinder, Fig. 7, exerts pressure on the fluid in the brake lines. This transfers an equalized pressure to pistons in each of the wheel cylinders, Figs. 3, 5 and 6. Each wheel cylinder contains two pistons, the purpose of the two being to distribute hydraulic pressure equally to the two brake shoes in each braking unit. As the pedal is released, the pressure is relieved and the brake-shoe retracting springs release the shoes from contact with the brake drums and, at the same time, force the pistons of the wheel cylinder inward. This movement forces fluid out of the cylinders and back into the brake lines.

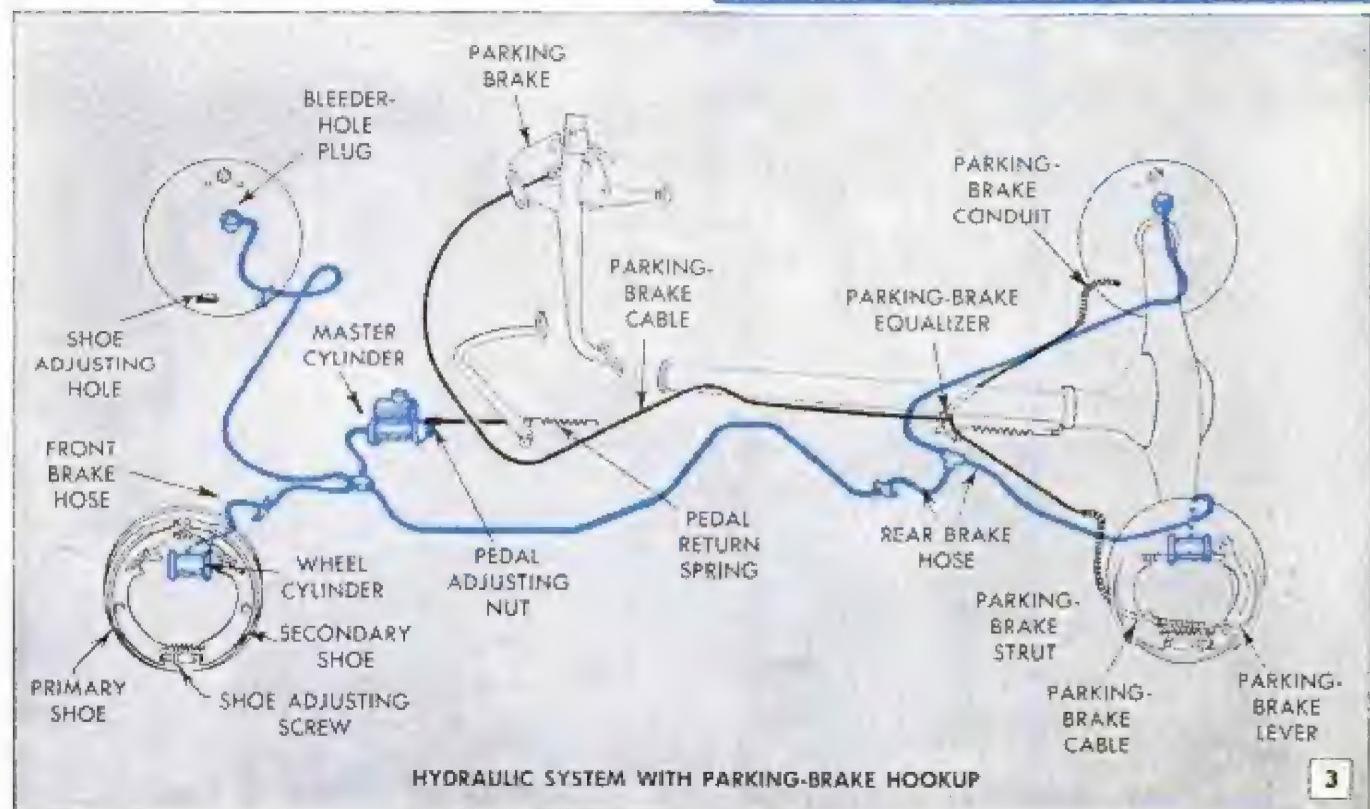
Before servicing the brakes, check the



1

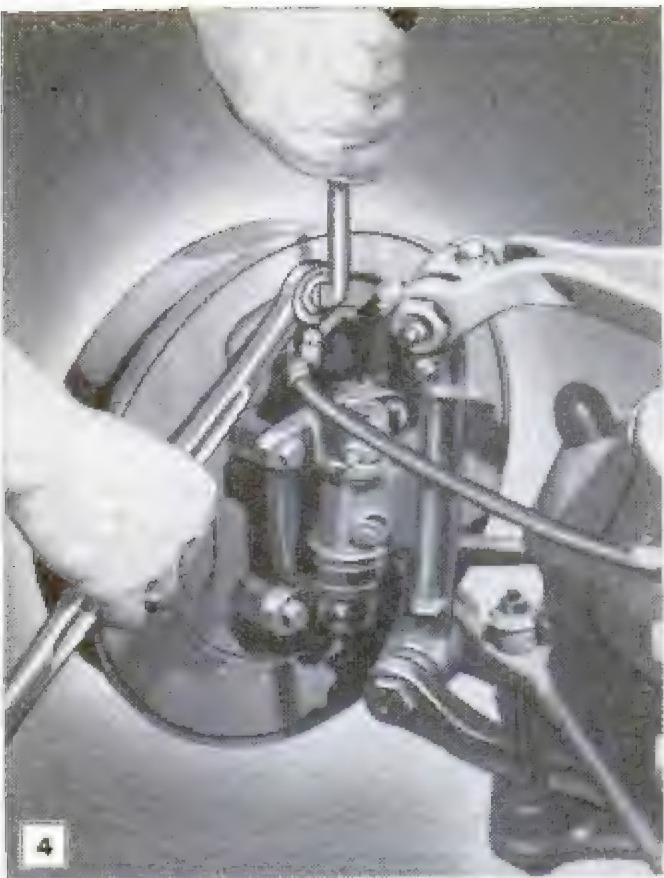


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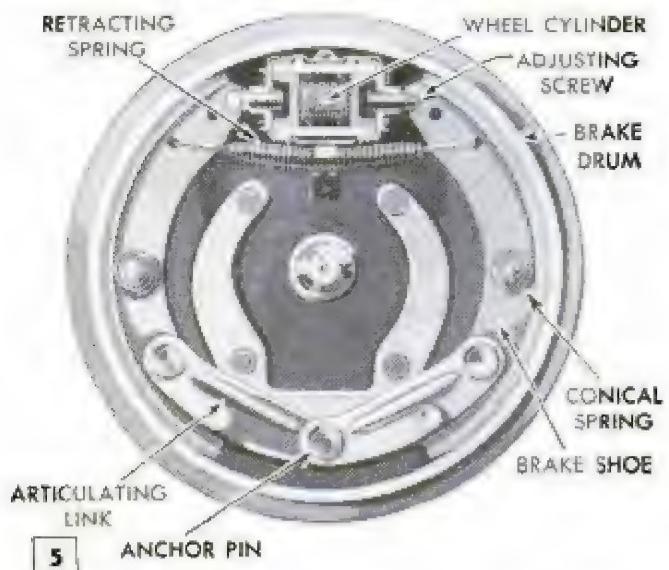
HYDRAULIC SYSTEM WITH PARKING-BRAKE HOOKUP

3



4

When new brake shoes are installed at the time of servicing, it's necessary to adjust anchor bolts. Although methods vary with different makes of brakes, the method shown above is typical of regular procedure.

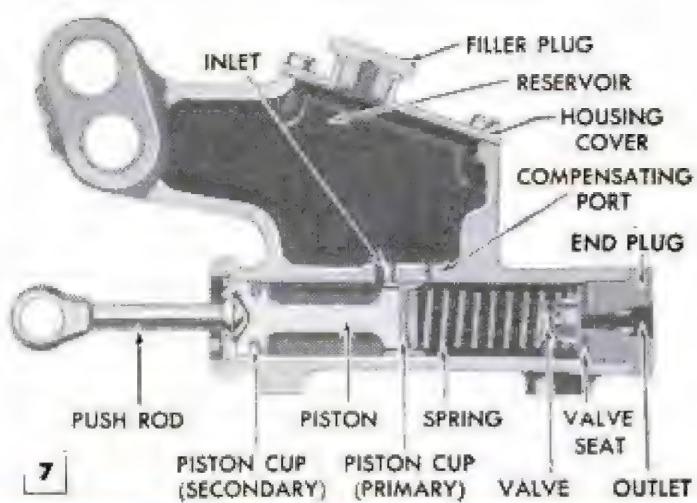


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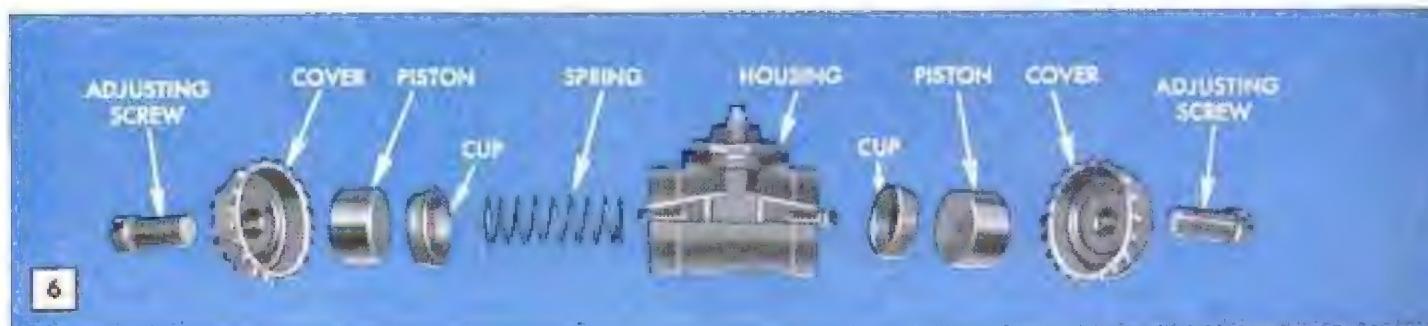
Sectional view, above, shows the hydraulic wheel cylinder and other parts of the brake unit. Below is a pull-apart view of the wheel cylinder, showing the various parts. Shown at the right is the master cylinder

pedal for free movement and toeboard clearance. There should be from $\frac{1}{4}$ to $\frac{1}{2}$ in. of free movement, A in Fig. 2. Full braking pressure should be available between the positions B and C. A soft, spongy pedal can mean that there is air or gas in the system or insufficient fluid. Check the fluid level in the master cylinder, add fluid if necessary and then, before bleeding the system, examine the lines carefully for leaks. In bleeding the system to remove air, it is a common rule that the longest pipe line should be bled first. Remove the bleeder valve screw, Figs. 8, 9 and 10. Then attach the bleeder drain, Fig. 8, being careful to keep the end of the bleeder drain hose below the level of fluid in the jar. Unscrew the bleeder valve one-half to three-quarters turn, depress the foot pedal by hand and then allow it to return slowly. Air in the system will show as bubbles on the surface of the fluid in the glass jar. Continue movement of the pedal until bubbles cease to appear. Then tighten the bleeder valve, remove the drain hose and replace and tighten the screw at the bleeder valve.

To adjust the brake shoes, jack up the car and block the axles so that the wheels can be turned freely. Disconnect emergency-brake pull rods and remove the adjusting-hole covers from the flange plates. On one common type of brake, these holes are located at the bottom of the flange plate as in Fig. 1. Insert a flat tool or a screwdriver in the hole. The end of the tool should engage the lugs on the adjusting cover or star wheel. Lift up on



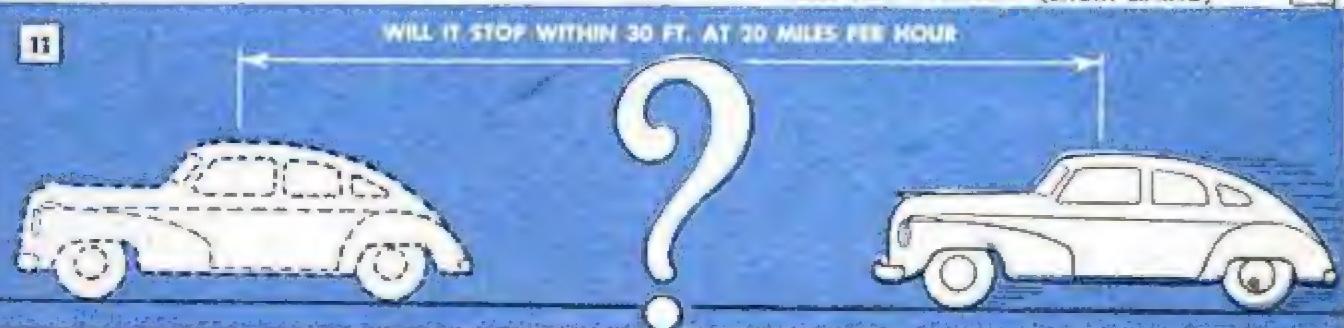
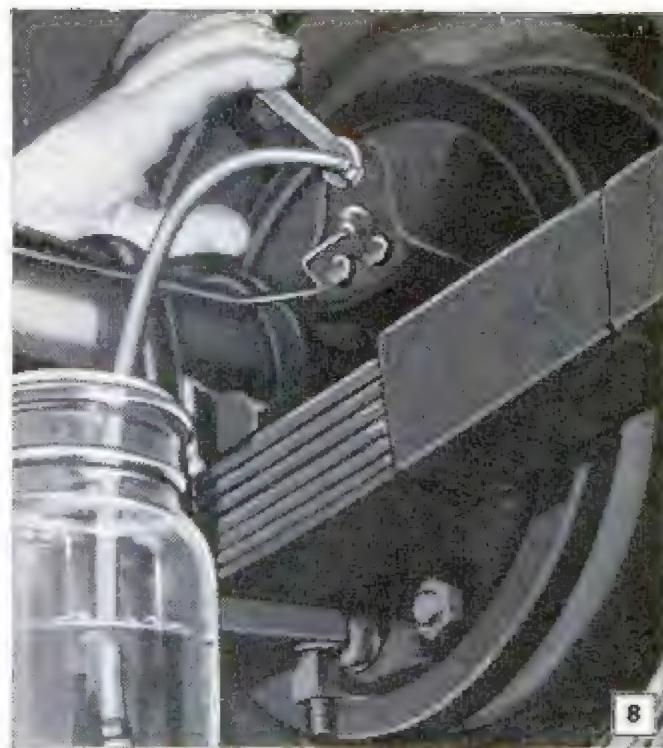
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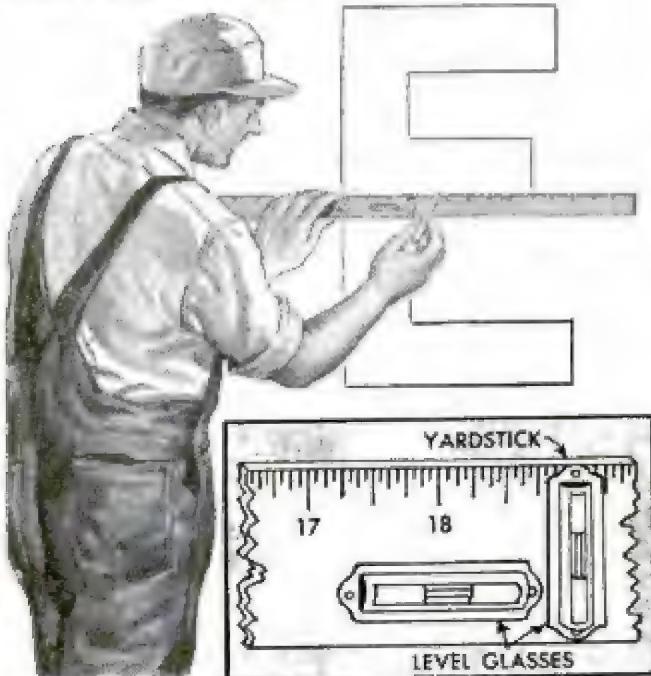
6

the adjusting tool to turn the star wheel to the right. Continue the adjustment on both star wheels until the brake shoes drag slightly when the road wheel is turned. Then back off the star wheel the required number of notches to give the brakes the proper running clearance. The service manual gives the proper number of notches to back the adjusting mechanism to get the correct clearance. The emergency or parking brake should be adjusted each time the service brakes are adjusted and, on some cars, it is necessary to adjust the parking brake before backing off the star wheels in the rear brakes. When new brake shoes have been installed at the time of servicing the brakes, it will be necessary to adjust all anchor bolts, Figs. 4 and 10. Although the methods will vary with different cars and makes of brakes, Fig. 4 shows the typical procedure in making this adjustment. After servicing the brakes, be sure that there is sufficient brake fluid in the master cylinder. The recommendations generally specify that it should be nearly full. Use only the brake fluid specified by the manufacturer of the car. On some late-model postwar cars, the brakes are of the self-centering, self-adjusting type. Under normal wear, this brake will not require servicing until replacement of the brake shoes is necessary. The brake automatically adjusts itself to compensate for each .005 in. of wear on the linings, keeping the running clearance always approximately the same.

To check performance of the brakes under the average driving conditions, road-test the car after the servicing has been completed. On dry, smooth concrete, the brakes should stop the car easily within a distance of 30 ft. at a speed of 20 m.p.h., Fig. 11, assuming, of course, that the tires are in good condition and have sufficient tread to grip the surface of the road effectively. This is a fair measure of brake efficiency but it is well to remember that other mechanical defects will affect good braking. Incorrect wheel alignment and wheels out of balance, worn tires, underinflation or overinflation of the tires, and worn wheel bearings are defects to look for if carefully serviced brakes do not give good performance under test.

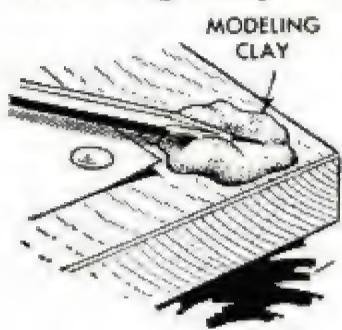


Levels Attached to Yardstick Aid Sign Painter



Two level glasses mounted at the approximate center of a yardstick save considerable time when sign painting. The level for horizontal lines must, of course, be attached exactly parallel with the edge of the yardstick, while the level for vertical lines must be exactly 90 deg. to the edge.—Bryant H. Neill, Waco, Tex.

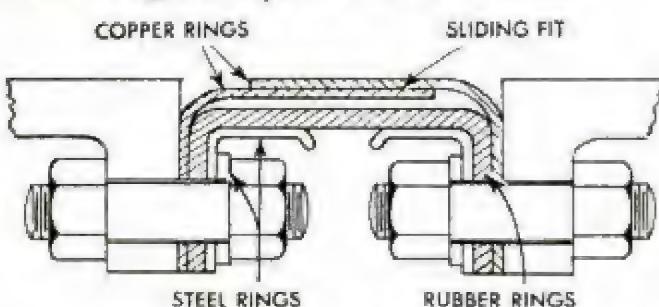
Modeling Clay Cleans Pencil



A small wad of modeling clay kept at one corner of a drawing board provides a handy means of cleaning newly sharpened pencils and removing partially dried ink from pens. The clay will

last for some time, as the soiled portion can be worked into the wad. The clay, of course, will stay in place on the board.

Watertight Expansion Joint

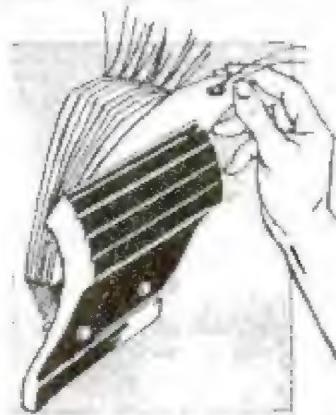


For long runs of pipe that are subjected to temperature extremes, this watertight joint allows for expansion and still with-

stands considerable pressure. Telescoping copper rings give lateral strength to the joint and a rubber ring makes it watertight. The latter should be replaced by a ring of synthetic material in cases where rubber is likely to deteriorate.

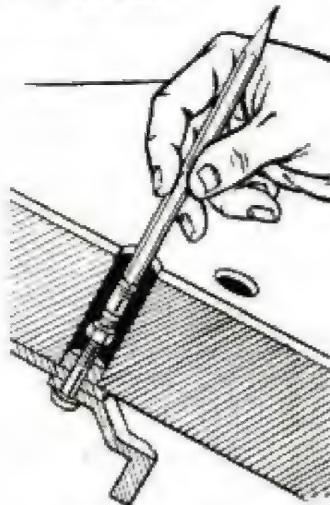
Tire Section Provides Tag Rack

Use a section cut from the side of an old auto tire to clamp job tags to a convenient spot on the shop wall. The section should include the rim and a portion of the tread. If the rim part of the tire section is nailed or screwed tightly to the wall, there will be sufficient clamping action to hold either a few or a number of tags securely in place.



Eraser Starts Nut in Recess

If a nut must be started on a bolt, the end of which is in a recess thus making it impossible to use the fingers, a pencil fitted with an eraser will do the trick. Just taper the eraser so its end will fit into the nut, twist the nut onto it, and start the nut on the bolt.

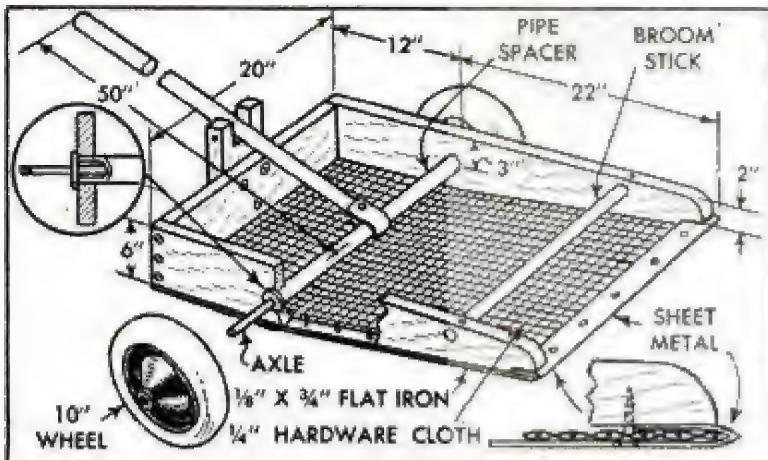


Roosting on Fountain Discouraged By Suspended Barrel Hoop

Poultry are discouraged from roosting on the top of a drinking fountain if a barrel hoop is suspended directly over it. Three wires tied to the end of the main wire are used to keep the hoop horizontal and these are made as short as possible so the hoop will tip easily when a chicken attempts to roost on it. The hoop is centered and hung an inch or two above the fountain.

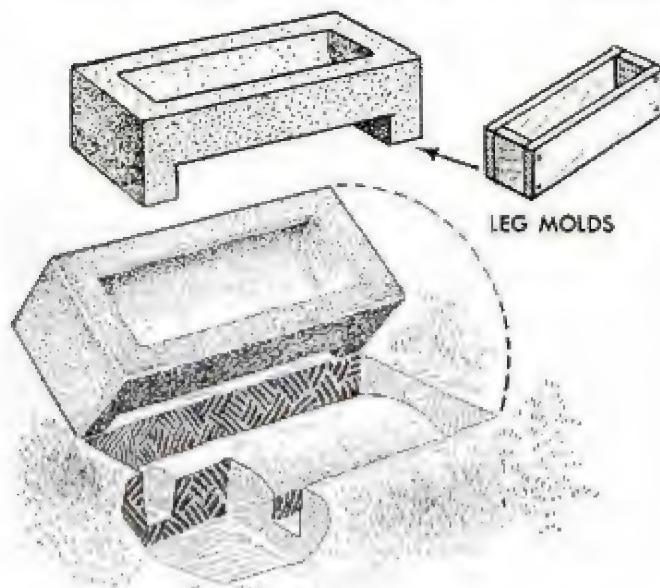


Combination Sweeper-Sifter for Poultry Yards



Cleaning poultry yards is done in a jiffy with this combination sweeper and sifter. Pushed along to gather litter and droppings, the sweeper is shaken occasionally to sift the load of dirt and sand. Except for the wheels and hardware cloth, the sweeper can be made from scrap materials.

Concrete Feed Troughs Are Made Easily by Molding in Earth Forms

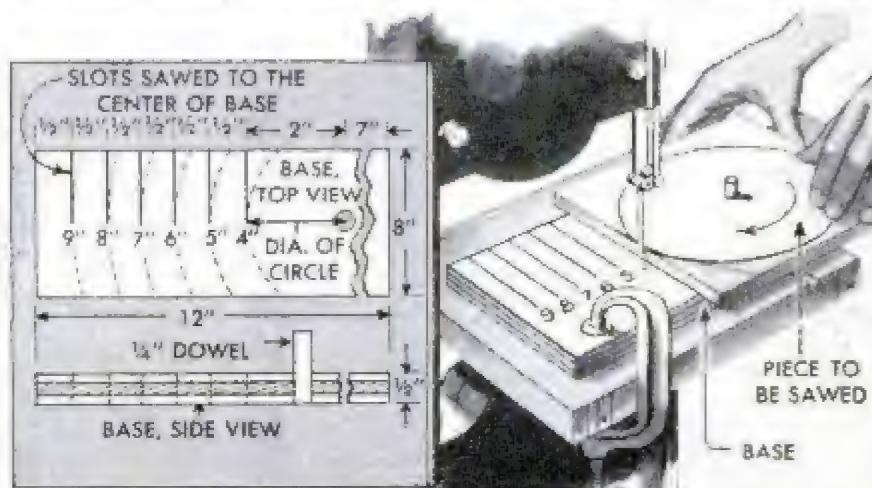


Needing several small feed troughs, I decided to cast them from concrete poured in forms dug in the ground, thus saving the expense of wooden forms. The form is dug as shown in the drawing, and the dirt is dampened and smoothed with a trowel. If the ground is dry, it must be thoroughly moistened before the concrete is poured to prevent the water in the concrete from being absorbed too rapidly. The trough is reinforced with chicken wire or iron rods, and wooden molds, which are placed on the bottom of the trough while the concrete is still wet, are used to cast the legs. After pouring is completed, the unit should be covered with damp straw and the concrete allowed to cure for several days.

Charles E. Mason, California, Mo.

Graduated Jig Permits Quick Setup to Bandsaw Circles of Various Sizes

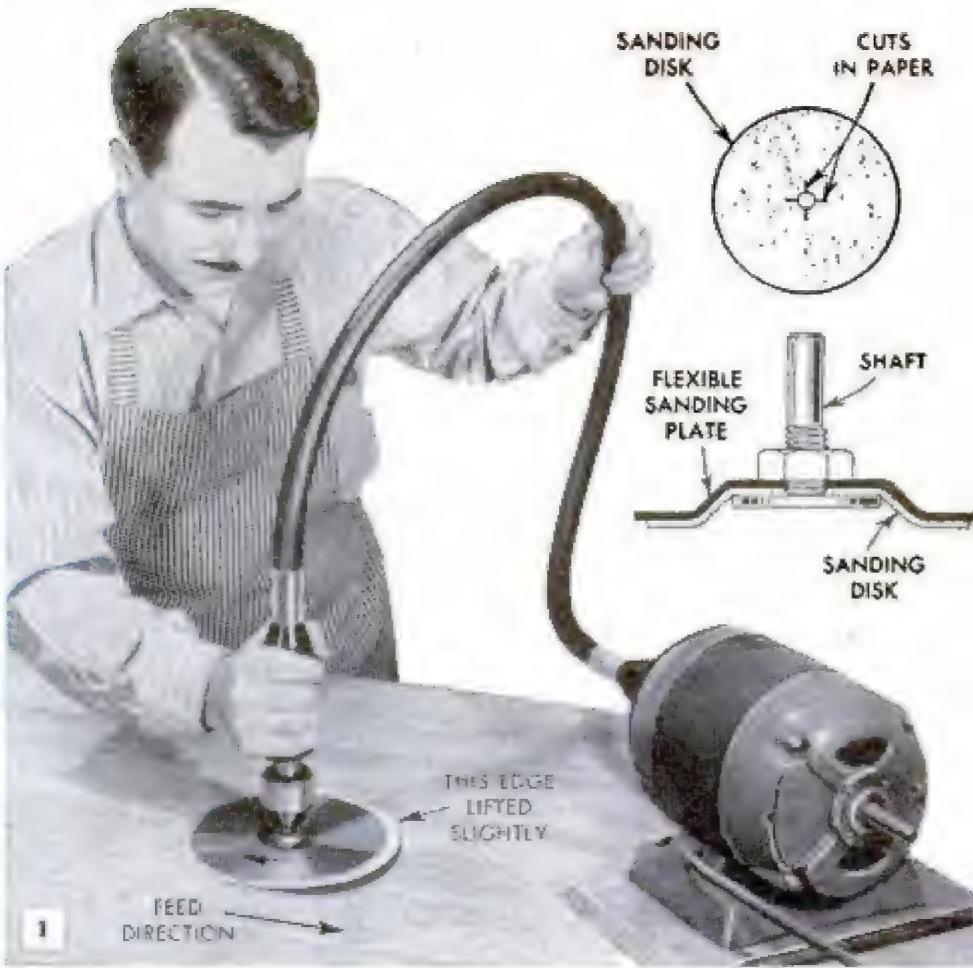
A few minutes spent in making this graduated jig will save considerable time when setting up circle-cutting jobs on the bandsaw. The plywood base is drilled near one end for a dowel pivot and slotted, as shown, for several circle diameters. To use, just insert the saw blade in the proper slot and clamp the base to the table. — Graham Cheek, Asheboro, N. C.



W.T.M. Concrete

Tool up with a **FLEXIBLE SHAFT**

By Sam Brown

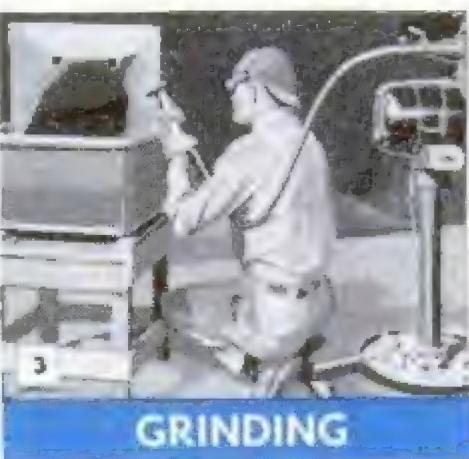


A FLEXIBLE SHAFT combines both the power and uses of many different tools in a handy portable unit. With it, you can carve, drill, sand, rout, buff, wire-brush, saw, polish and grind simply by using the necessary accessories on the projecting end of the shaft at the handpiece, Figs. 2 to 4 and 7 to 9 inclusive. Large flexible shafts are widely used in industry for such heavy operations as removing rust and scale, grinding welds, polishing large surfaces of metal and snagging castings.

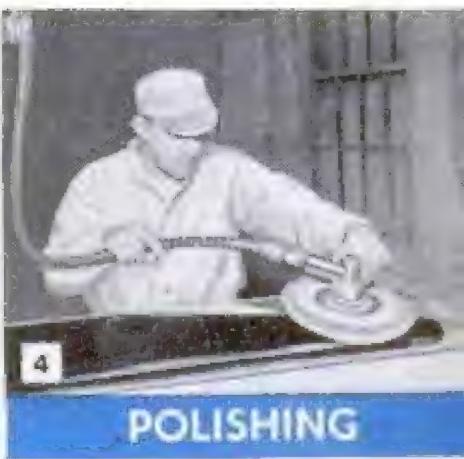
Flexible shafts usually are rated large or small according to the size of the shaft, or core, as it is called. A large flexible shaft is one having a core $\frac{1}{16}$ in. in diameter or larger, while a small shaft is one having a $\frac{1}{8}$ to $\frac{1}{4}$ -in. core. The large shafts will transmit power for the heaviest work that can be done with hand-held tools, and small shafts are especially suited to use with tiny rotary files, grinding wheels and polishers, which must be rotated at extremely high speeds. The small shafts are quite flexible and will operate efficiently when curved to a comparatively short radius.



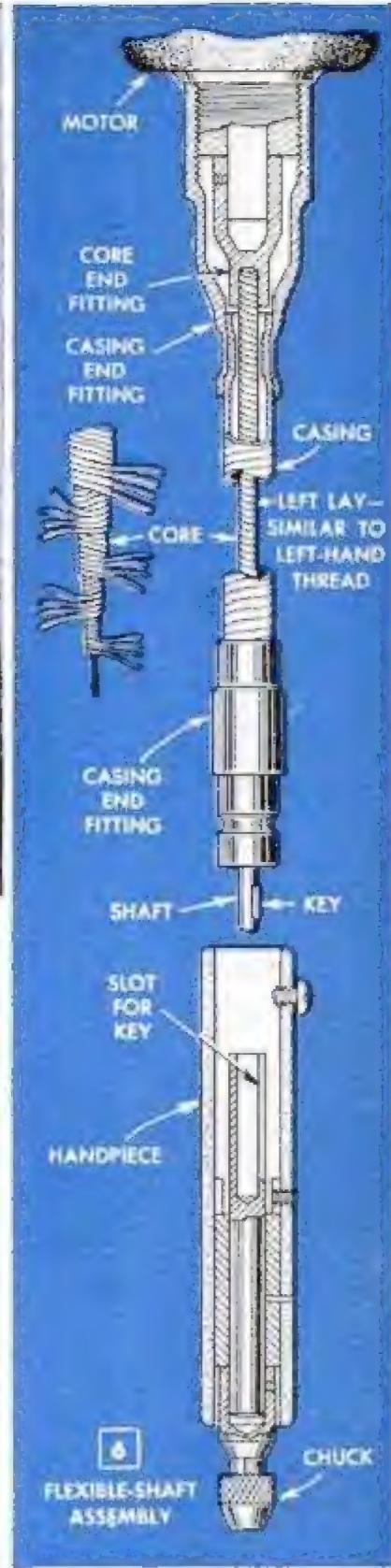
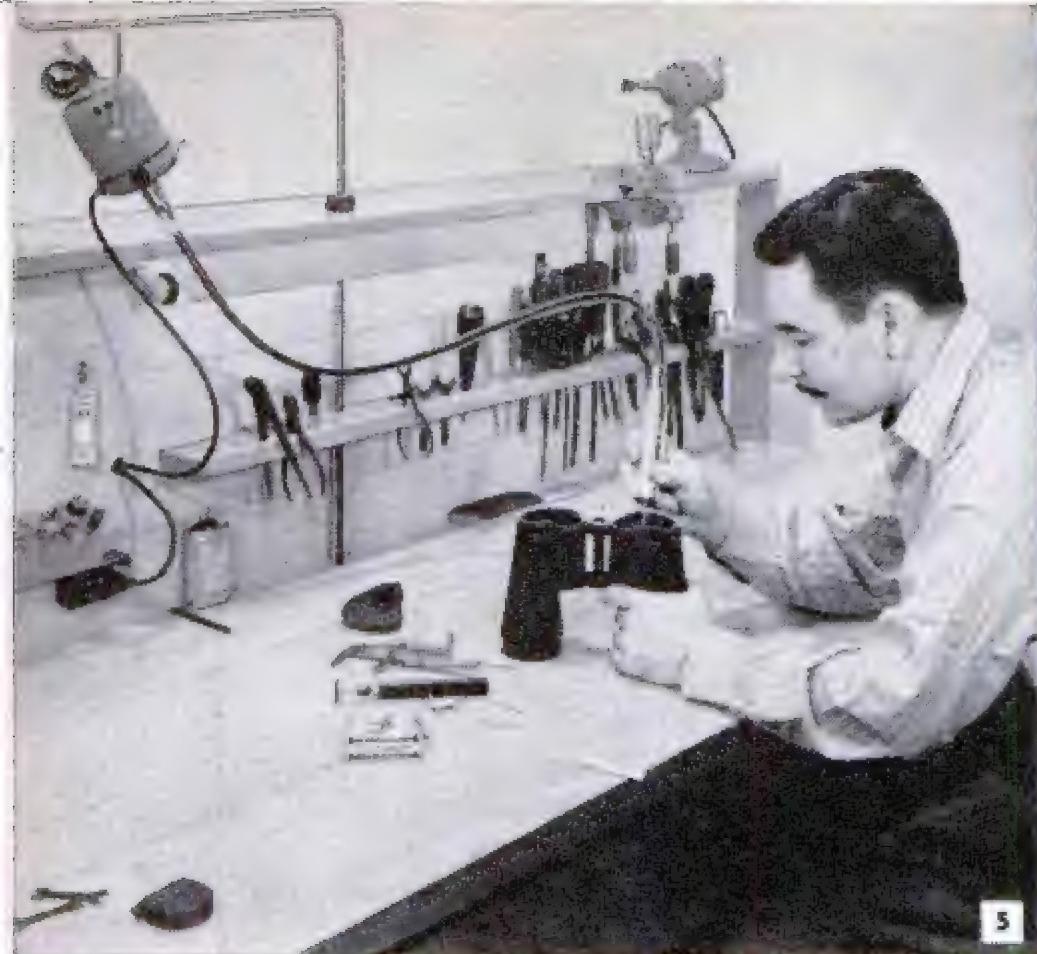
SANDING



GRINDING



POLISHING



A flexible shaft consists of a stationary casing and a core, which rotates inside the casing. The core, in both the large and small sizes, is a precision-built unit consisting of layers of spring-steel piano wire wound to produce an alternating right and left-hand pitch, as in Fig. 6. The pitch of the outside layer determines the direction in which the shaft should be rotated. Most shafts are left pitch and should be operated in a clockwise direction, as this movement tends to tighten the outer winding of wire. Clockwise direction of rotation is common to lathes, drill presses and also to most types of motors. It is possible to reverse the direction of rotation of the shaft where the work load will at no time exceed half the power rating.

Although some casings consist only of a continuous spring-steel strip wound spirally with interlocking edges, most of the better-quality shafts are fitted with casings of braided wire and molded rubber or fabric coverings which give somewhat greater flexibility and ease of handling. Small shafts designed for high speeds often have a spiral inner liner which fits loosely over the core and has the effect



BUFFING

DRILLING

CARVING

FLEXIBLE SHAFT DATA

① CORE DIAMETER	② HP. AT 1750 R.P.M.	③ MAXIMUM SPEED	④ MINIMUM RADIUS	⑤ LARGEST GRINDING WHEEL	⑥ DEFLECTION PER FT. OF LENGTH	SPECIFIC USES
$\frac{1}{16}$ "	1/100	25,000 R.P.M.	4"	$\frac{1}{2}$ " DIA.	100°	VERY DELICATE WORK ONLY —LIMITED USES
$\frac{1}{8}$ "	1/18	18,000 R.P.M.	5"	1" DIA.	70°	ALL KINDS OF CRAFTWORK WHERE FLEXIBILITY AND CONTROL ARE MORE IMPOR- TANT THAN POWER
$\frac{3}{16}$ "	1/10	12,000 R.P.M.	6"	2" DIA.	40°	
$\frac{1}{4}$ "	1/6	8,000 R.P.M.	6"	3" DIA.	30°	LIGHT DUTY CONTINUOUS BUFFING, POLISHING AND GRINDING. SINGLE OR MULTIPLE-SPEED UNITS
$\frac{5}{16}$ "	1/4	7,000 R.P.M.	7"	3½" DIA.	22°	
$\frac{1}{2}$ "	1/3	6,000 R.P.M.	8"	4" DIA.	18°	USUALLY 4-SPEED UNITS. USED FOR ALL KINDS OF MEDIUM TO HEAVY SANDING, GRINDING, ETC., PREFERABLY AT A FIXED LOCATION
$\frac{7}{16}$ "	1/2	5,000 R.P.M.	10"	5" DIA.	15°	
$\frac{1}{2}$ "	3/4	4,200 R.P.M.	10"	6" DIA.	11°	

① General average values — cores of the same dia. may vary in construction so that values given are only an all-around average.

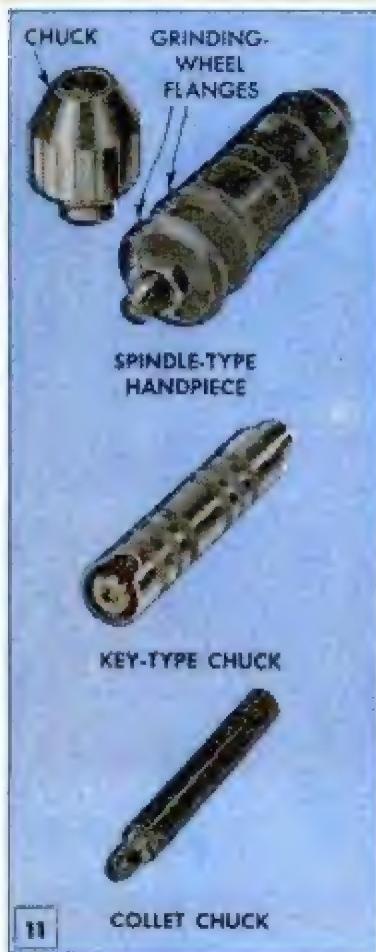
② This column lists largest motor generally used. Safety factor is about 4. Motor power can be increased proportionately with increase in shaft speed. Example, $\frac{1}{4}$ -in. core can handle 1/6 hp. at 1750 r.p.m., or 1/3 hp. at 3600 r.p.m.

③ Main consideration is the prevention of shaft overheating which occurs if shaft runs much over 500 surface feet per minute. Most shafts under $\frac{1}{4}$ -in. dia. are powered with universal motors and will run much slower than "no load" speed of motor.

④ Values given are normal for good power transmission but shafts can be worked at sharper curves for occasional work.

⑤ These diameters are based on what the shaft will stand and also on how fast any grinding wheel can be operated with safety. Wire brushes, buffs and sanding disks can be larger.

⑥ This column shows deflection or "windup" of shaft under full load. A $\frac{1}{8}$ -in. shaft, for example, will deflect 70 deg. per foot. If the shaft is 3 ft. long, total deflection will be 210 deg. or a little over $\frac{1}{2}$ of a full turn.



of reducing friction. Connecting members of the shaft are press-fitted into the casing and are designed to permit coupling directly to the motor at one end and to the handpiece at the other. When the shaft is operated straight or nearly so, Fig. 12, the end of the core extends only slightly. Fig. 13 shows how the core extends when the shaft is flexed. One end of the core is fixed in the connector and the other end is splined or keyed to the connector to permit movement in and out when the shaft is operated on a comparatively short radius. On some shafts, this movement is taken up at the motor end, the handpiece end being fixed. Shafts of this type can be attached directly to a motor shaft, Fig. 1, or to a drill press, Fig. 18. When connected to the drill press, as in Fig. 18, it should be kept in mind that the torque of the drill-press spindle far exceeds the load limit of the shaft.

Simplified data on the common sizes of flexible shafts is given in the table, Fig. 10. The data given is not exact but is average for all shafts. If you want a shaft for light craftwork, such as modelmaking, the $\frac{1}{8}$ to $\frac{3}{16}$ -in. core size is a good selection. For heavy grinding, buffing, and wire-brushing, the $\frac{5}{16}$ -in. core is sufficiently strong to take the torque of motors up to $\frac{1}{2}$ hp. For the small shaft, the handiest length is 3 to 3½ ft. and the large shaft should be 5 to 6 ft. long. Such shafts are available as motor-and-shaft units with variable speeds, and also for direct attachment to motors, or any spindle of proper size and speed.

The business end of the flexible shaft is the handpiece and, in the larger units, many different types of handpieces are



12



13



14

MOTOR MOUNTS

Motors for powering small flexible shafts should be supported with a swivel joint for ease in manipulation. Fig. 14 shows a motor hanging from a vertical arm which is held by a toolbox. For portability, the motor can be carried on a shoulder strap as in Fig. 15. Bench-work requires that motor be supported overhead. See Fig. 16

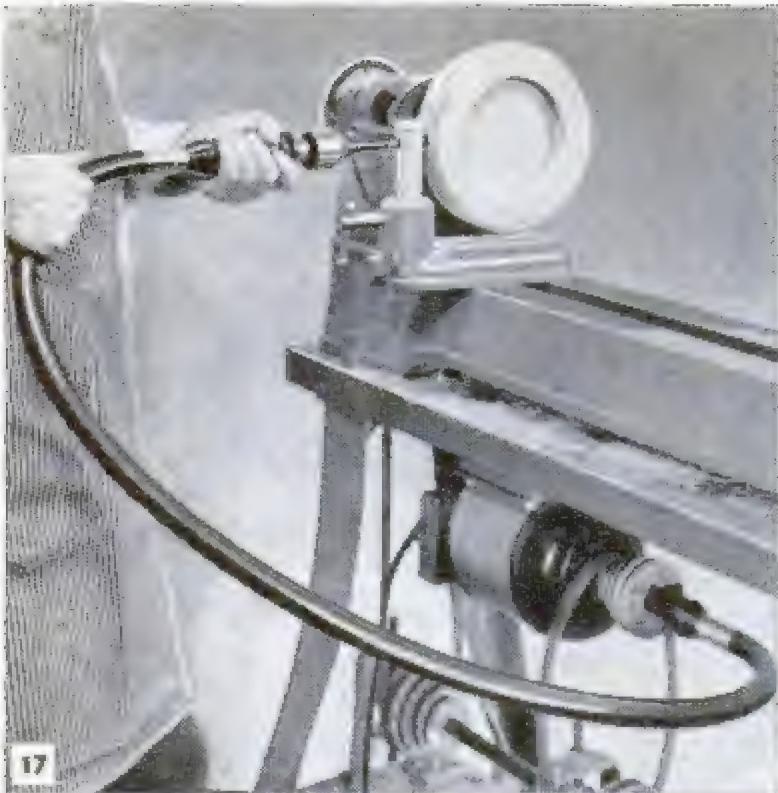


15



16

available. The straight, spindle-type handpiece, Fig. 11, usually is supplied with the large shaft. Flanges for this handpiece permit mounting accessories which have a center hole and can be held between the flanges. A hand-closing chuck having a threaded shank, which can be screwed onto the handpiece spindle, is useful for holding drills and any other tools having shanks of a diameter within the capacity of the chuck. Grinding wheels should not exceed the diameter given in the table, but such accessories as cloth buffs and sanding disks can exceed the grinding-wheel diameters by as much as 25 percent. A common handpiece supplied with the small shafts is either a collet chuck or a chuck tightened by means of a special key or spanner-type wrench, Fig. 11. These usually have a capacity of $\frac{3}{32}$ or $\frac{1}{8}$ in., adapters being available for holding the in-between sizes. Such chucks are ideally suited to driving mounted grinding wheels, wire brushes and small rotary files. The key-type chuck is available in either sleeve-bearing or ball-bearing construction, but collet chucks usually are supplied only with sleeve bearings. Right-angle handpieces are supplied for use with the heavy shafts. Figs. 2 and 4 show this type of handpiece in use.



Core of shaft is cleaned and lubricated at regular intervals

Proper installation of the flexible-shaft unit is necessary if you are to get the most out of this versatile tool. One of the handiest arrangements for using a small shaft-and-motor unit is that in Fig. 5. On such units, the motor is provided with a bail or hook so it can be hung at some point above the work. In this case, a swinging arm mounted on the bench tool panel makes it possible to use the shaft unit at any point on the bench top. Other applications, using the same motor unit, are shown in Figs. 14, 15 and 16. Similar units are available with larger shafts and motors. The larger units also are supplied with a special floor stand as in Figs. 2 and 3. On these units, the motor base swivels, permitting the unit to follow the movements of the operator without undue flexing of the shaft. In small commercial shops and home workshops, the larger shafts can be set up as in Fig. 1, the motor being bolted to a wooden base.



Power take-off for driving flexible shaft can be made from drill-press spindle, as above, or from lathe motor, as at the left

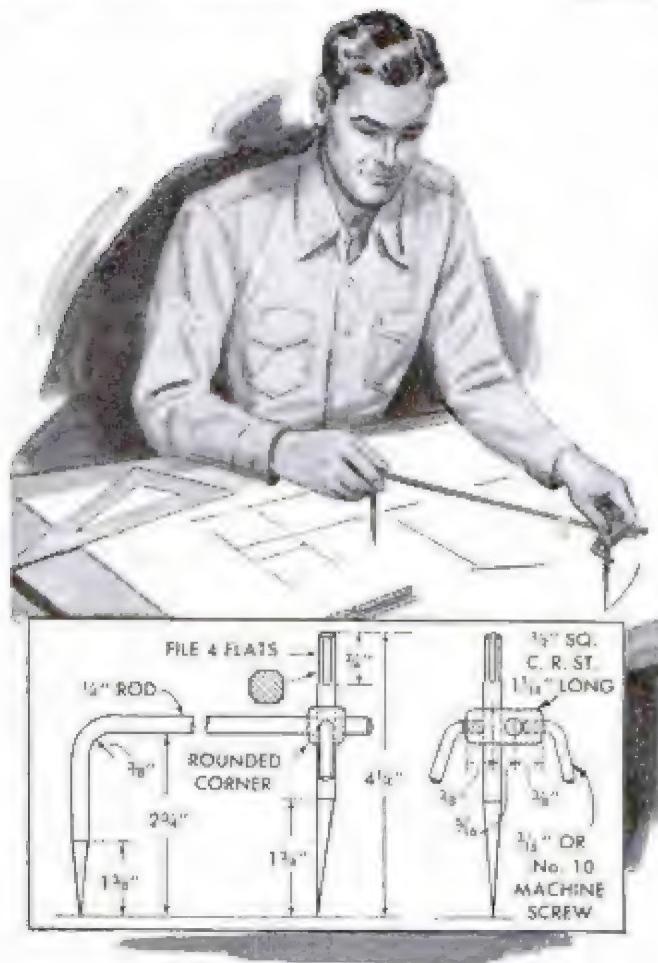
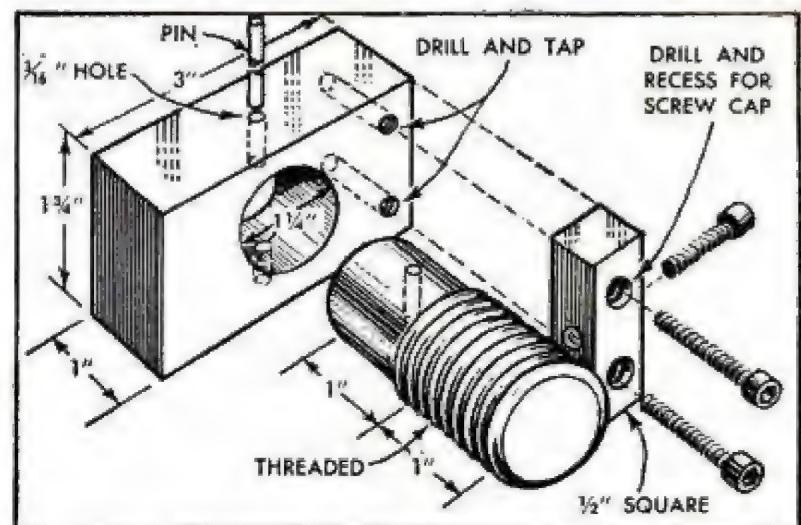
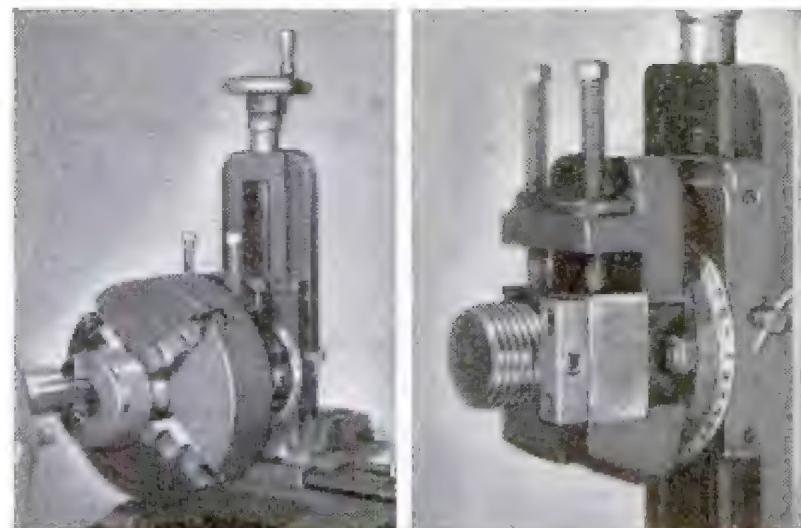
The same type of shaft as that in Fig. 1 is shown in a somewhat different adaptation in Fig. 17 where it is being driven by the lathe motor and is used to drill index holes in a wood turning. In the setup shown in Fig. 1, maximum freedom of movement is obtained with the end of the motor shaft toward the operator, a trick to remember when operating a flexible shaft with the motor mounted on a stationary base. Disk-sanding is done with a special flexible disk constructed as shown in the details in Fig. 1. The abrasive disk usually is not attached to the backing disk with adhesive but is held in place by a recessed flange. In operating a disk of this type on large flat surfaces, make a one-way stroke with the leading edge of the disk lifted slightly as shown. In this way, the trailing edge will not leave scratches on the work. A lamb's-wool bonnet for polishing can be fitted over this type of disk.

Flexible shafts used intermittently need little servicing, except that care should be taken to make sure that the shaft does not run without lubricant. Dismantle the shaft at regular intervals and clean all the parts with a solvent as in Fig. 19. When assembling after cleaning, renew the lubricant with the grade specified by the manufacturer. Ball-bearing handpieces usually are provided with separate oilholes having ball closures. These handpieces should be lubricated at regular intervals with a medium machine oil or any special lubricant specified by the manufacturer.

(Certain photos courtesy R. G. Haskins Co., Delta Mfg. Co., Foredom Electric Co., and The Dumore Co.)

Increasing Range of Lathe Milling Attachment

Easy to make and simple to use, this handy adapter considerably increases the usefulness of a lathe milling attachment. The base of the adapter is clamped in the milling-attachment vise, and work that is irregularly shaped or too large for the vise is mounted on a faceplate screwed on the adapter stub. For milling round work, the faceplate is replaced with a four-jaw chuck. All parts of the adapter are made of cold-rolled steel. One half of the stub is threaded the same as the lathe spindle, and the unthreaded portion is a force fit in a slightly undersize hole drilled through the base. A registering hole is drilled through both stub and base for a $\frac{3}{16}$ -in. steel pin which holds the stub in place. A piece of $\frac{1}{2}$ -in. square stock, drilled and tapped for a setscrew, is mounted on the face of the block as shown in the detail. Note that the three holes drilled in this piece are counterbored for fillister-head screws. The setscrew, of course, is turned through the piece of square stock and against the hub of the chuck or faceplate to lock it on the stub.



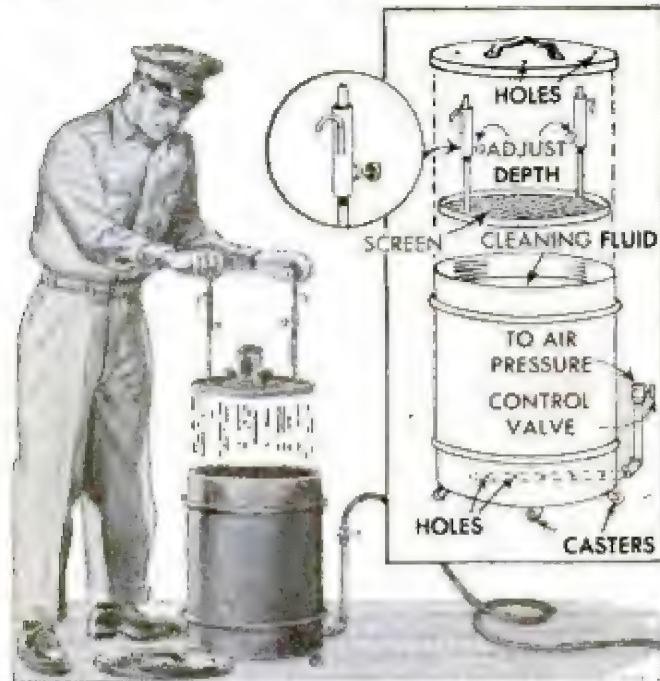
Trammels Made From Drill Rod Also Used as Beam Compass

Made primarily from drill rod, this set of trammels is inexpensive and, by replacing the adjustable scribe with a pencil, it doubles as a beam compass. The beam and pivot point are made in one piece, one end of the rod being bent 90 deg. and pointed as shown. The adjustable point, or scribe, fits in a sliding head made of $\frac{1}{2}$ -in. bar stock. Flats are filed on four sides of the upper part of the adjustable point to aid in turning it for the proper setting, and the tip of the point is bent to align with one side. Note that the locking screws for the adjustable point and the sliding head are bent from machine screws. In use, the sliding head is locked at the approximate setting. Then, the eccentric point is turned to the exact setting and also locked in place. To make accurate settings easier when using the tool as a beam compass, the upper part of the pencil can be filed at an angle so that the point is eccentric.

Earl R. Goddard, Denver, Colo.

¶ Pour paraffin over unused paint remaining in a can and it will not harden.

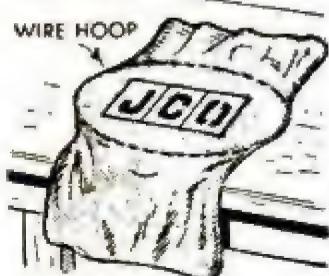
Homemade Car-Parts Washer Agitated by Compressed Air



One mechanic uses a homemade washer agitated with compressed air to wash car parts quickly and thoroughly. The washer consists of an old oil drum, a tight-fitting cover, an adjustable parts rack and a length of pipe inserted at the bottom of the drum for an air intake. A series of holes is drilled along the portion of the pipe inside the drum, and the outer end is fitted with an air-hose connection and a control valve. The parts rack is simply a metal frame covered with screen wire. Two pieces of rod are welded vertically to the frame, sleeves being slipped over the rod and tightened with setscrews to permit adjusting the rack for depth. Note that holes are drilled through the cover to allow the air to escape and that casters are welded to the bottom of the drum to make it portable. Be sure that the cover is tightly in place before turning on the air pressure full force.

Elmer Vandrey, Truman, Minn.

U.I.'51 Grain Sacks Stenciled Easily



A hoop of stiff wire inserted in a grain sack will stretch the sack taut for easy stenciling. The hoop can be made from a wire clothes hanger.

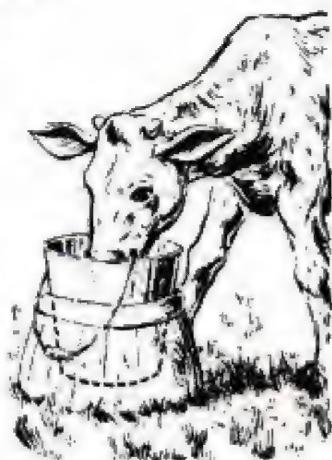
Antifreeze Drained Without Loss

Clamping a length of hose to the radiator drain cock permits draining antifreeze into a gallon jug or other container without losing a single drop. In addition, this pre-

vents splashing the underside of the car and the garage floor. Clamp the hose to the drain cock by twisting a piece of wire around it.—T. A. Thom, Knoxville, Iowa.

Sunken Nail Keg Holds Pail To Feed Young Calf

Instead of taking time to hold the feed pail when feeding a young calf, one farmer sets the pail in an empty nail keg which is partially embedded in the ground. Earth is shoveled into the keg to help anchor it. Of course, it is necessary to embed the keg at such a depth that the rim supports the pail at the proper height for feeding. Mounted in this way, it is difficult for the calf to overturn the pail and spill the feed.



Half Gate in Farm Fence U.I.'51 Ideal for Occasional Use

When farm lots are fenced with boards, narrow swinging gates are a convenience in passing from one lot to another. If infrequent use does not warrant the time and expense of installing full-size gates, a half gate will be found handy. This is easy to make and costs practically nothing. Just install a couple of boards vertically in the fence and saw off the upper boards between them. Then make a half gate from these short pieces and hinge it to one of the uprights.

Marion L. Rhodes, Knightstown, Ind.

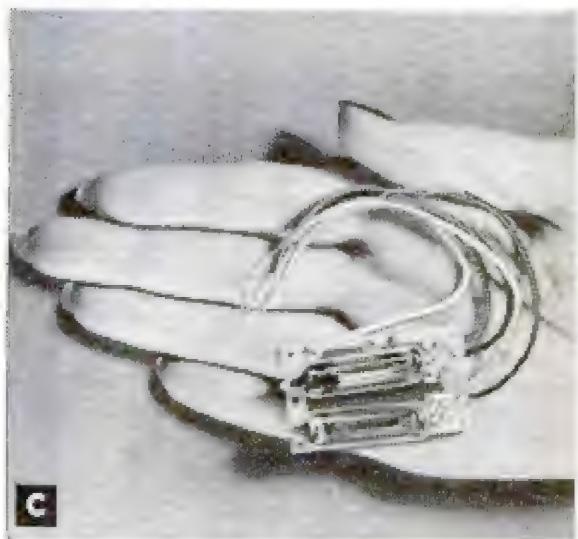


Portable Civilian Transceiver

RADIO TRANSCEIVERS for public use between homes, automobiles, offices, manufacturing plants, farms, and many other person-to-person radio-telephone applications are now claimed to be in pilot-plant production according to one manufacturer who has received F.C.C. approval. The portable battery-operated combination transmitter and receiver is to be used on the 465-mc. band allocated for civilian use, when licensing is authorized.

The compact unit is about one fourth the size of the famous wartime walkie-talkie and is the result of two years of research and engineering in which many new techniques, including the use of "printed" silver-on-ceramic circuits, and subminiature tubes played an important part. In order to qualify for the F.C.C. approval, experimental units have been given exhaustive field tests by the manufacturer. These tests have been made between auto and home, home and office, boats and shore, planes and ground, and from person-to-person on city streets. It is also claimed that they have been tested for practical push-button operation in the field between hunters, mountain climbers, farmhouse and field, and by surveyors. This pioneer manufacturer predicts that this type of personal two-way radio will become a standard means of eyewitness reporting of sports and news events to radio and television audiences and to newspapers.

Two transceivers of the type shown in photos A and B are required for person-to-person air contact. In actual operation, the unit is held in the position shown in photo A. It weighs only 11 ounces, including the small folding antenna, and it is housed in a tiny case measuring $1\frac{1}{4} \times 2\frac{7}{8} \times 6$ in. This pocket-size radio station includes all necessary equipment except a tiny headphone and the necessary batteries, which are carried in a separate case about the size of a miniature camera. Photos B and C show the ultracompact construction made possible by the subminiature tubes and "printed" circuit. This model 100-B citizens' transceiver is for Class-B stations only, operating on 465 megacycles, tolerance 0.4; input of 3 watts; emission, A-3 with 30 percent maximum modulation. The transmitting section uses a Sylvania 6K4 subminiature oscillator, and the receiver is a super-regenerative type using three Sylvania 1V5 subminiature tubes. Two of these tiny tubes are shown mounted on one of the ceramic panels in photo C. The total weight of the station equipment, including batteries, is $2\frac{1}{2}$ pounds. The practical range is about two miles, depending upon the terrain.



LOW-COST 2-TUBE PROGRESSIVE

By S. A. Johnson

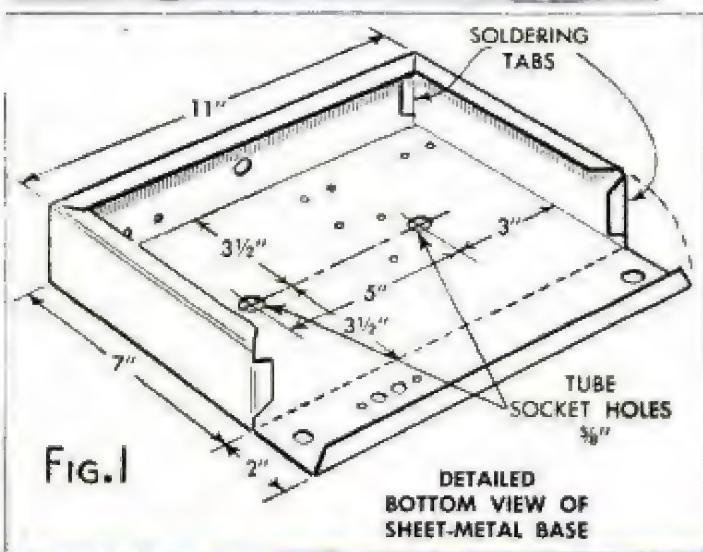
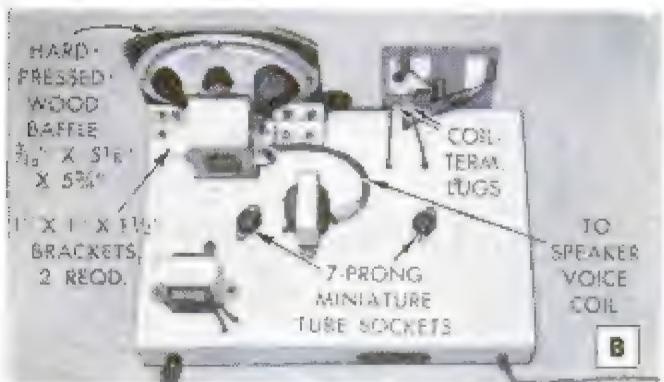
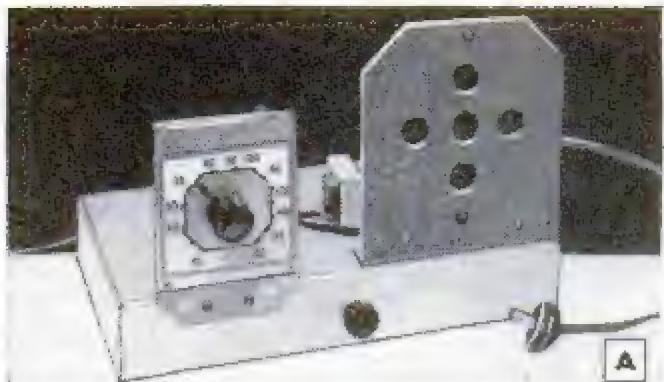


FIG. 1

THIS EXTREMELY SIMPLE and highly efficient two-tube receiver will be of interest not only to the builders of Unit No. 1, the one-tube set that appeared in the January issue, but also to anyone who wants an inexpensive, easy-to-build, broadcast-band receiver that will operate a loudspeaker to good room volume. Since this second model has a built-in power supply, it eliminates the 45-volt B-battery used in the previous set, and operates directly from your 110-volt a.c. supply line. It employs all of the same parts except the switch on volume control R5, which is changed to a single-pole, single-throw type. Therefore, the beginners who built Unit No. 1 can build this more powerful set with a minimum of expense and trouble, as only a few parts are added.

A type 6AK6 miniature power-pentode tube is now employed as a power amplifier for the output of the original 6J6 twin-triode tube; all of the excellent performance of the one-tube set is retained, with the added advantages of loudspeaker volume and all-electric operation. Both set No. 1 and set No. 2 are complete, individual units and need not be built progressively unless desired. Those who built the first set are advised to remove all wiring, except the tube-filament circuit, from the chassis base and completely rewire the circuit for this new 2-tube loudspeaker model.

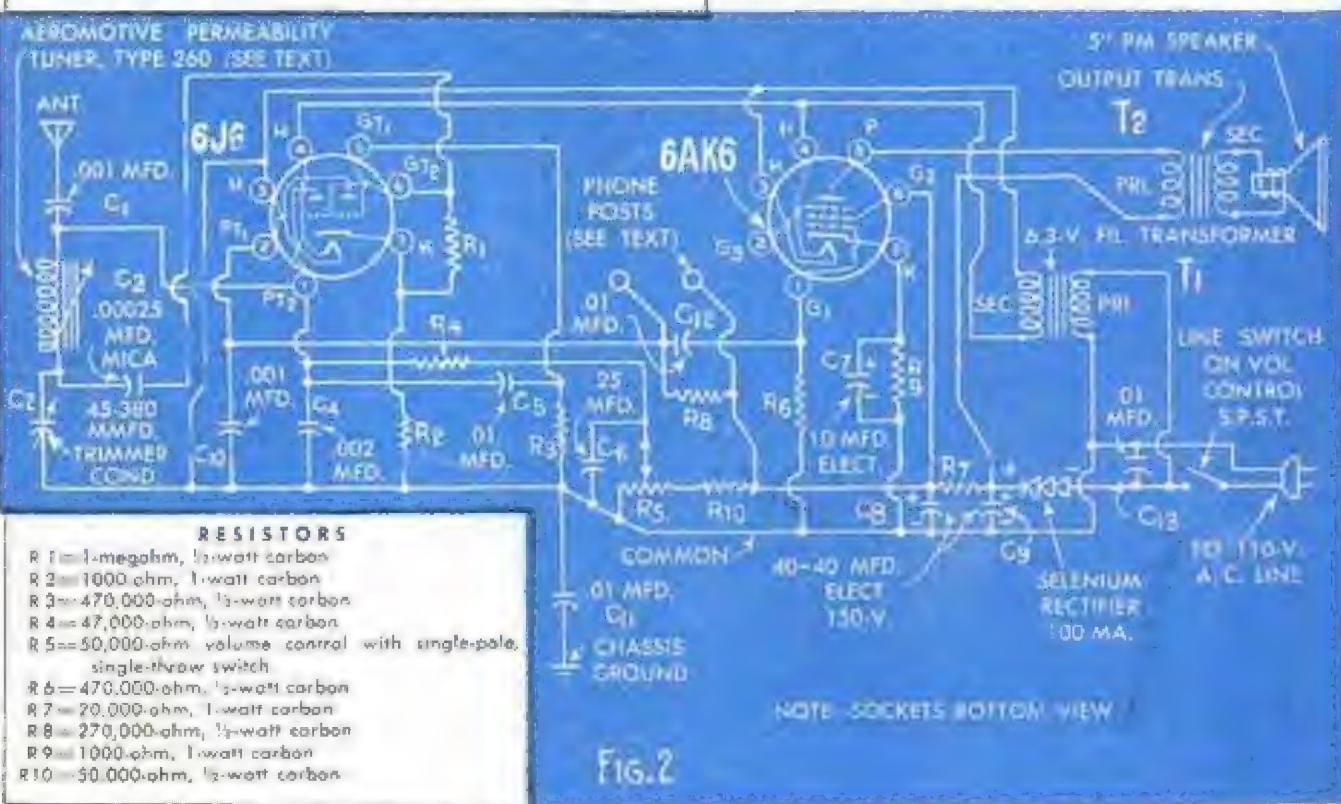


FIG. 2

BEGINNER'S SET—UNIT NO. 2

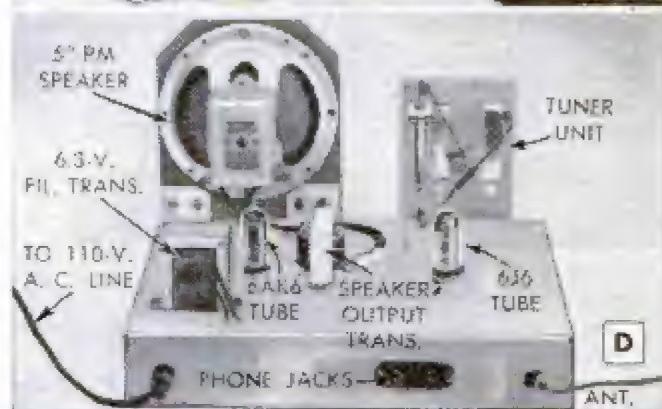
Some of the original wiring will be the same but it is always best to "clear the deck" as it is very easy to become confused when adding the parts that are specified for this new 2-tube circuit. The same permeability tuner is used, of course. This is an Aeromotive type-260 regenerative permeability tuner which provides a very effective tuning arrangement that has few parts and covers the standard broadcast range from 550 to 1600 kilocycles. This tuner is listed in the 1949 radio-parts house catalogs for \$1.44. It replaces the usual single-gang, variable-tuning condenser and eliminates all coil winding. The assembly includes the dial, which has a good-looking gold, buff, and brown-finished scale, as well as the coil and tuning knob. The entire assembly comes ready for mounting on the chassis base. Since the tuner has but two connections, it simplifies wiring and thus reduces the chance of errors.

A detailed view of the sheet-metal base is given in Fig. 1; this is a standard size

(Continued to page 242)



C



2

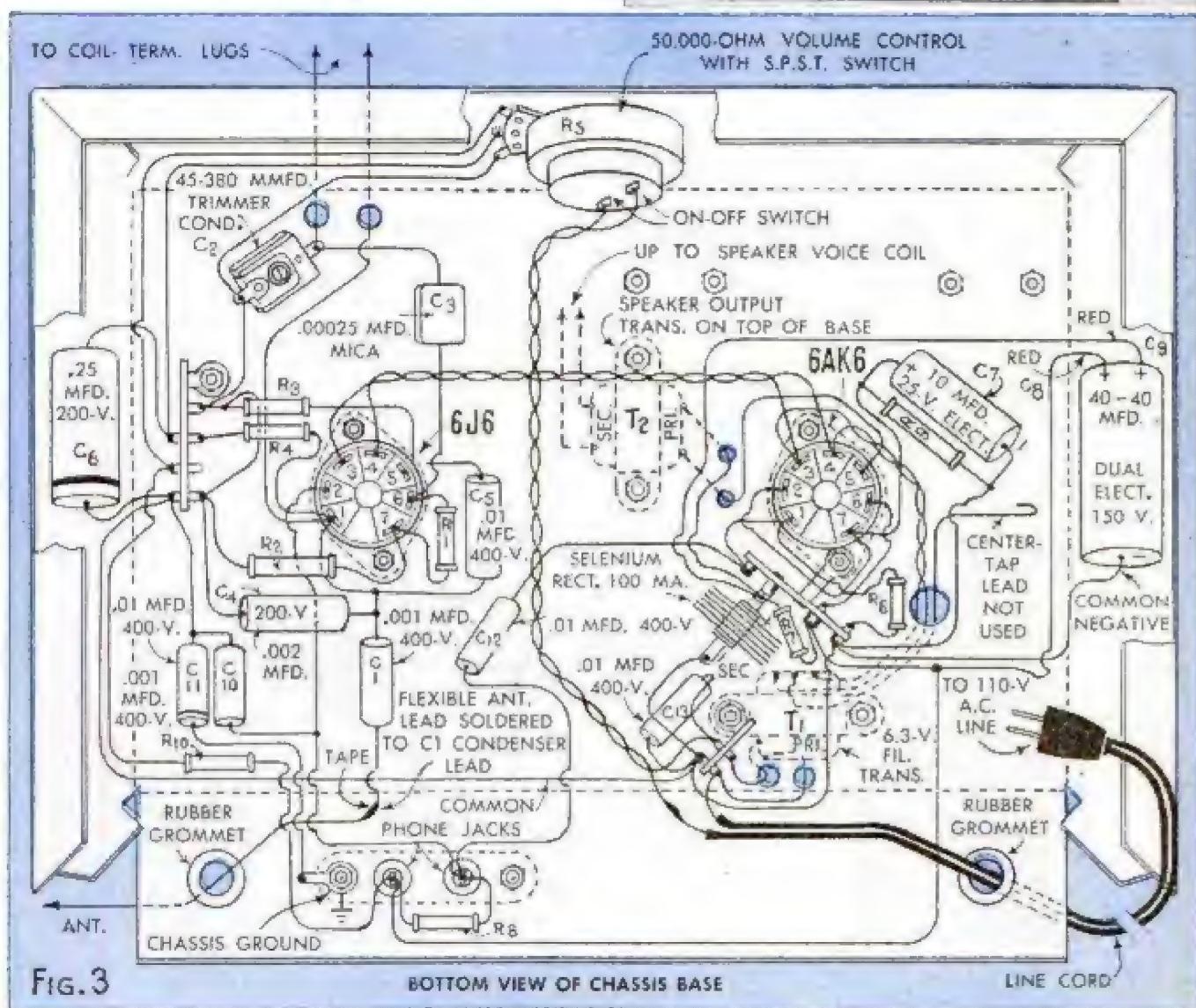


Fig. 3

BOTTOM VIEW OF CHASSIS BASE

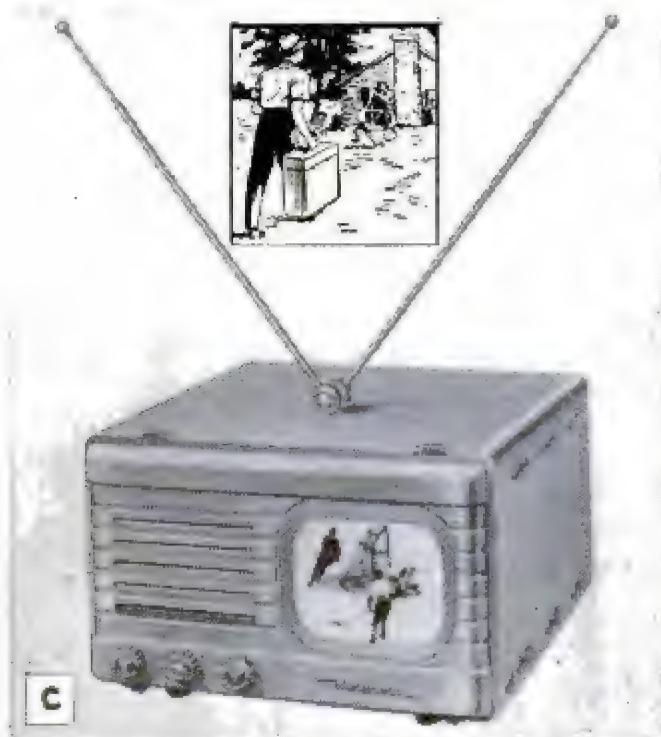
SIGHT AND SOUND TODAY



A



B



C

A—Either conventional rectangular TV pictures or circular enlargements from about the center of the regular picture are now available on the same viewing tube in this Garod television receiver. The inset photo shows the conventional picture, which the young lady can change at will by means of the push-button remote-control switch she holds in her hand. The switch is connected to a 15-ft. cord and provides close-ups of faces or specific events in the scenes. This Tele-Zoom feature is claimed not to distort the image. The operator can change back at will to the conventional-size picture whenever crowd action or an entire scene is preferable for viewing

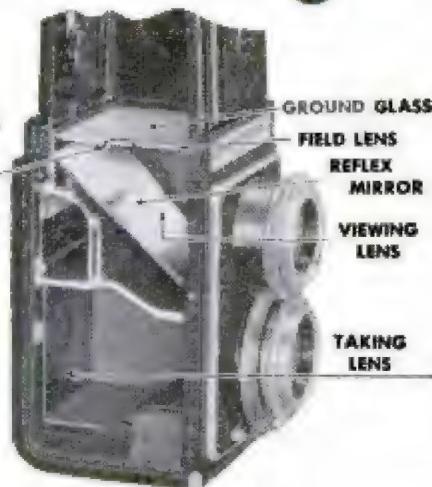
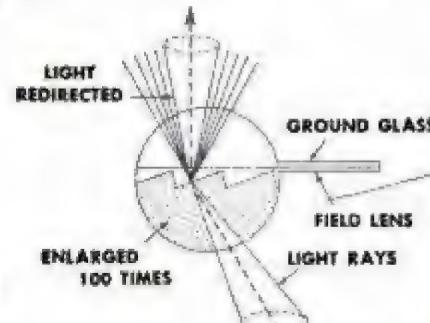
B—Completely portable, this television receiver includes an adjustable portable-type antenna that straps inside the lid of the case when not in use. The set employs a 7-in. picture tube and can be used wherever alternating current and TV broadcasting are available. It is built on the same chassis as the table-model Motorola VT71 and features the same simplified controls. C—This shows the portable TV set ready for use with the adjustable antenna inserted in its socket. The antenna snaps into place and may be rotated for peak performance. With antenna, set weighs 33 pounds. Case cover is leatherette

D—New type of record and automatic record player recently introduced by RCA plays a single-size disk about 7 in. in diameter for all classifications of recorded music, popular, classical, folk and children's material. Operation at 45 r.p.m. provides up to 5 minutes and 15 seconds of playing time on each side or up to 42 minutes when eight records are stacked on the automatic record player. Record-changer mechanism is claimed to be unusually fast and to eliminate 75 percent of the problems encountered in the conventional changers. The outstanding feature is the large, 1½-in., plastic-capped center spindle which houses the noiseless trigger-fast drop mechanism



D

See the image $2\frac{1}{2}$ times as Bright



(Prices subject to change
without notice)

SPARKLING BRIGHT describes the image you see in the finder of the new Kodak Reflex II Camera. Sharper focusing, edge-to-edge composing are made possible with the new Kodak Ektalite Field Lens beneath the ground-glass screen (see diagram above). Microscopic lens grooves redirect stray light rays—give you an image *2½ times as bright overall, 10 times as bright at corners*, as with the usual ground-glass finder.

And of course you get all these Kodak *plus features*—Lumenized twin lenses, four-element Kodak Anastar f/3.5's . . . fast-action 1/300-second flash shutter . . . new automatic film stop.

Seeing is believing—so inspect the new Kodak Reflex II Camera at your nearest dealer's. The camera with case, \$135 plus tax.

The NEW Kodak Reflex II Camera



Flashholder, \$9.50 plus tax.
New two-piece field case
comes with camera.

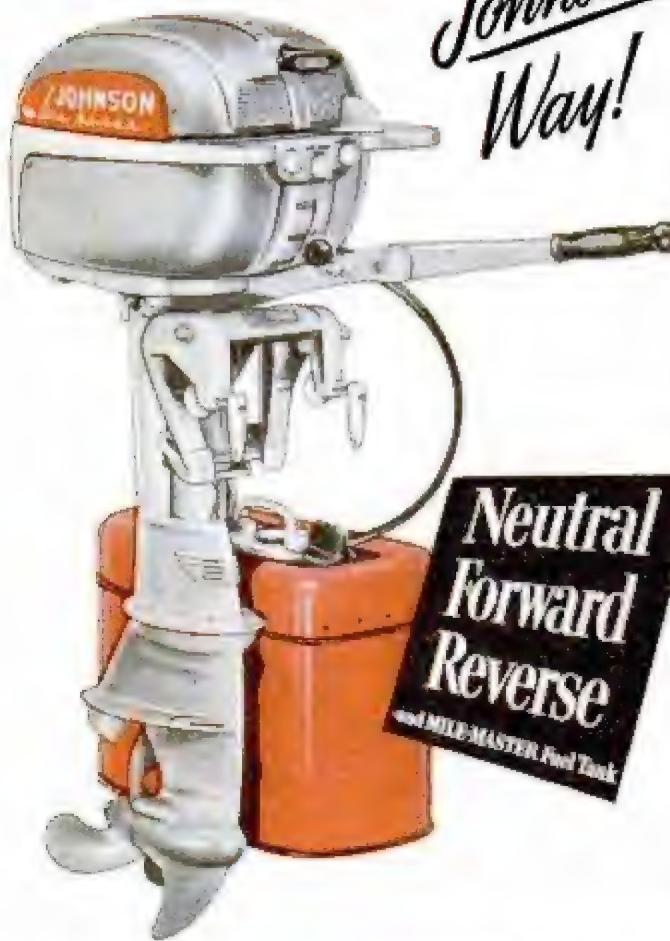
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But there's much more! Separate, Mile-Master Fuel Tank, for *hours* of cruising without refueling. "Hold-your-hat" acceleration. Slow trolling speed (in a 10.0 h. p.* motor!). 40 great features. And Johnson DEPENDability! Look for your Johnson dealer's name under "Outboard Motors" in classified phone book.



*10.0 OBC Certified brake H.P. at 1000 r.p.m.

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FREE HANDY CHART

Write for 1949 Sea-Horse Handy Chart. Illustrates charts the QD and the 4 other great Johnsons for '49. All features fully described.



JOHNSON MOTORS,

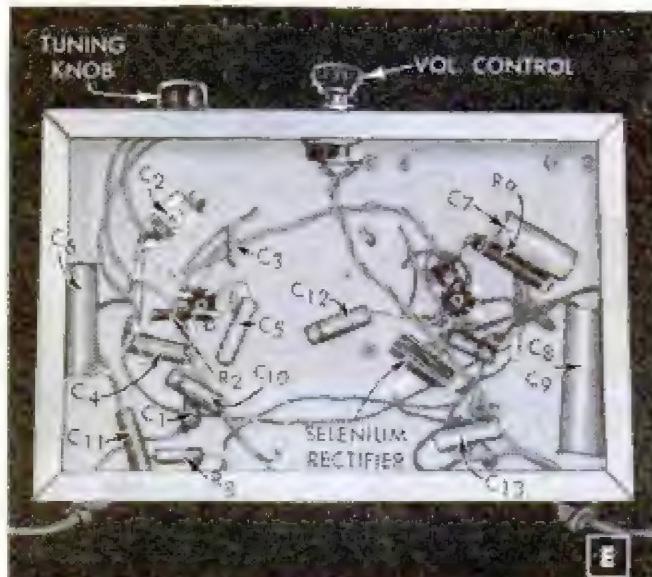
400 Pershing Road, Waukegan, Illinois
Johnson Motors of Canada, Peterboro, Canada

Beginner's Set—Unit No. 2

(Continued from page 239)

available from all parts houses for about \$1.00. The dimensions are, of course, the same as for the previous set. Those who wish to make their own base can omit the ends, turned-over edges, and tabs. The base may be made of .055-in.-thick aluminum or any suitable sheet metal that can be bent to shape between two blocks of wood clamped in a vise. Drill all holes indicated in Fig. 1; the holes for the miniature tube sockets are $\frac{1}{8}$ in. in diameter. Small drill holes may be reamed out to this size with a tapered reamer, or a Greenlee chassis punch may be used.

Photos A, B, C, D and E show various views of the completed set; if you did not build Unit No. 1, you should study these photos carefully and note how the various



parts are mounted on the chassis base. The schematic circuit diagram appears in Fig. 2 and the pictorial wiring diagram is given in Fig. 3. Please note that this pictorial wiring diagram shows a bottom view of the chassis base. The miniature tube sockets should be mounted so that the blank terminal space is in the position shown. Use No. 20 insulated hookup wire for the circuit and make all soldered connections with rosin-core wire solder. The selenium rectifier is made self-supporting on the terminal strip by soldering its positive terminal directly to one of the insulated lugs on the terminal strip as shown in Fig. 3; it must clear the metal base. When wiring the circuit, check each lead carefully with both the pictorial and schematic wiring diagrams and mark out each lead on Fig. 3 with a colored pencil when it is completed. The use of tie-point strips having insulated terminal lugs simplifies circuit wiring. They enable the builder to use shorter

(Continued to page 244)

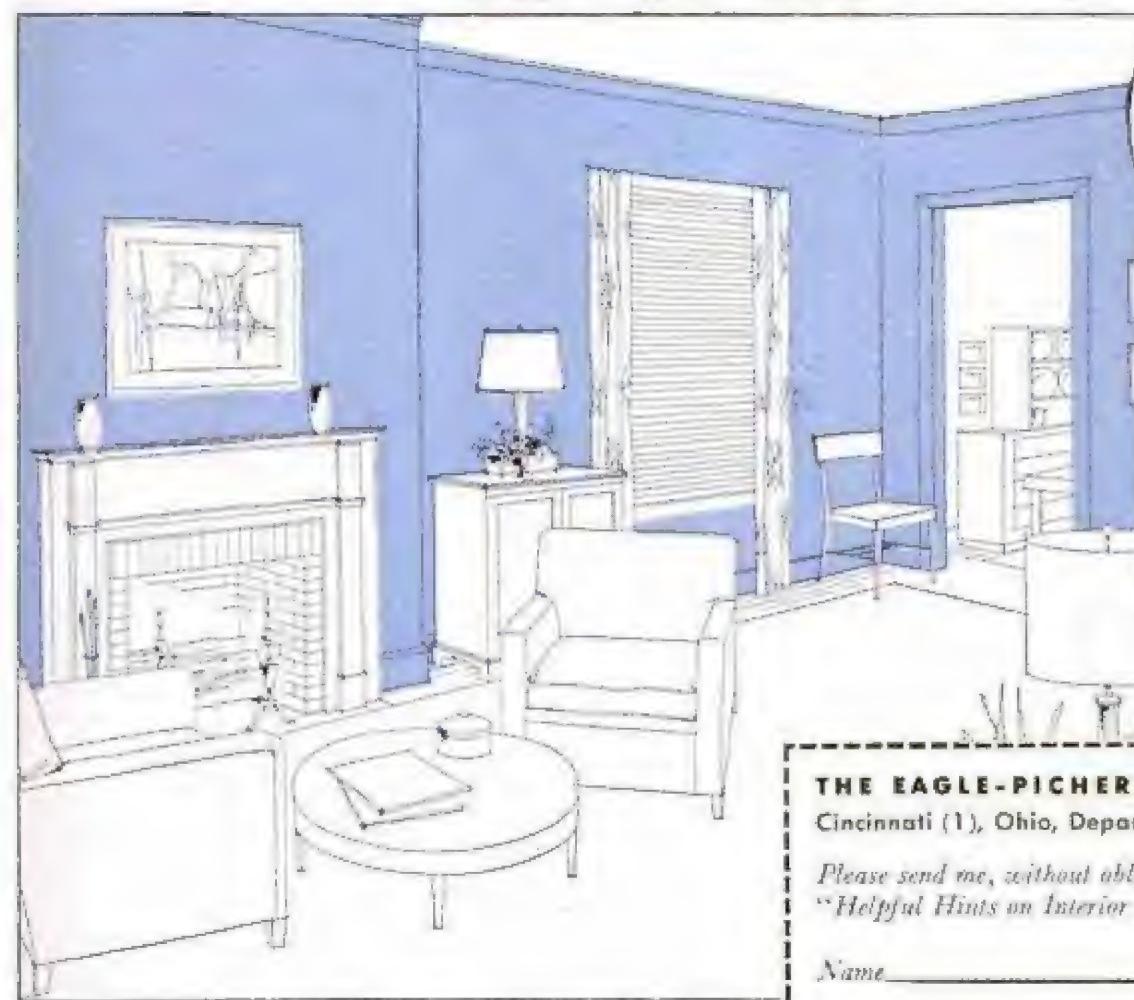
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The color in this illustration is Potters Blue. Other colors available in harmonizing Eagle-Picher Decorator Paints are: Roman Ivory • Twilight Gray • Desert Sand • Dresden Blue • Dusty Rose • Harvest Peach • Lettuce Green • Daffodil • Elfin Green.

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leads and to make a neater wiring job. The various fixed resistors and condensers are self-supporting by means of their "pigtailed" wire connections. Use care in soldering leads to the terminals of the small tube sockets.

The 5-in. permanent-magnet (PM) speaker is mounted on a $\frac{3}{16}$ x $5\frac{1}{8}$ x $5\frac{3}{4}$ -in. hard-pressed-wood baffle, which in turn is mounted on the chassis by means of two metal angle brackets. First of all, five $\frac{3}{4}$ -in. holes are drilled in the baffle, as shown in photo A, to act as the speaker grille. These holes are then backed with a piece of grille cloth which is glued in position before the speaker is mounted.

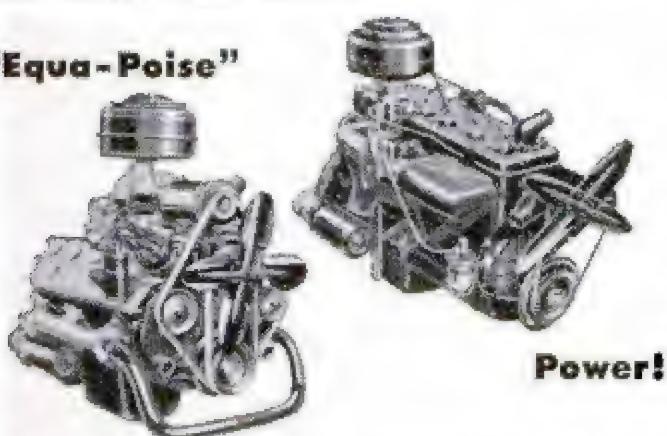
When the set is completely wired and the tubes are inserted in their respective sockets, plug in the power cord and rotate the volume control so that the switch is in the "on" position. Thanks to the selenium rectifier, the set warms up very quickly. As soon as the brief warm up is completed, you should be able to hear some "whistles" as you rotate the tuning-dial knob. "Backing off" the volume control brings in clearly the station you want to hear and eliminates the whistle. There is a certain knack in tuning a set of this type but you can learn it in a very few minutes by experimenting. As in the case of the one-tube set, a short, indoor antenna will give the best selectivity, but a long, outdoor antenna will provide stronger signals. Use the antenna that gives best results in your location. Once you have tuned in a station that you can identify and for which you know the frequency, set the dial pointer to that frequency. Then adjust trimmer condenser C2 under the base with a small screwdriver so that the dial pointer will always indicate that station. Always be careful not to turn the dial pointer past the scale limits. You will find that the position of the power plug in the wall sockets has a noticeable effect on hum level. Try reversing the plug in the wall socket if hum seems excessive. No external ground is used with this receiver; the set receives the effect of a ground through its connection with the power line. The headphone jacks on the rear of the chassis are retained in this new set for those who want to listen to programs with headphones after others have gone to bed. Simply plug the headphone-cord tips into the jacks and remove the 6AK6 tube. Removing the tube silences the loudspeaker; the remaining 6J6 tube gives excellent headphone volume. Detailed student material list R-376 for this low-cost progressive set Unit No. 2 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage.

More Facts about the NEW FORD "FEEL"

When you drive this great '49 Ford, you sense in an instant the new Ford "Feel"—a feeling of effortless control, relaxing comfort and reassuring security—a feeling of eager and flexible response.

And one of the big reasons back of this new Ford "Feel" is . . .

"Equa-Poise"



Take your choice of either the new 100 h.p. V-8 or the 95 h.p. Six and get smooth,

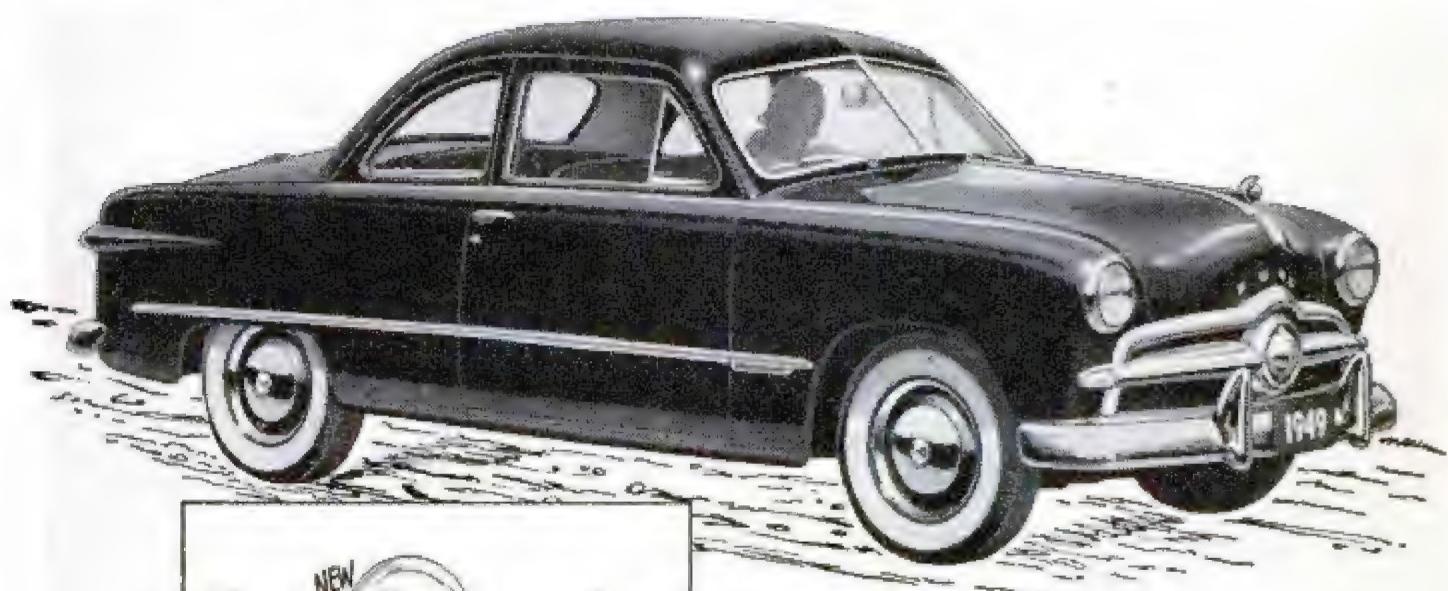
brilliant performance. Both engines are "Equa-Poise" mounted. Both incorporate a number of advancements in basic design—both are truly *new*. New "Equa-Flo" Cooling System, "Deep-Breath" Manifolding, "Power-Dome" Combustion Chambers and improved lubrication all contribute to Ford's feeling of responsiveness.



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THE SIMONIZ COMPANY, CHICAGO 16, ILL.



Use Simoniz Kleener (liquid or paste) to clean finish. Then Simoniz for lasting beauty. Sold everywhere!

How to Tempt a Fish

(Continued from page 112)

are most numerous in May and June. Later in the year, when the fish are feeding on grasshoppers and other bugs, the trout are not so fussy about what they take.

A few years ago, John Alden Knight came forth with his much-respected theory that fish feed during certain periods. Charts in his book tell you when during the day you should fish. These time charts are called the Solunar Tables.

No one has yet developed a successful fish call like a duck call or a moose call, but Frank Steel now has an instrument called the "Fish Finder" that makes fishing sound easy. He is the present world-record holder for Chinook salmon, with an 83-pounder which he caught in 1910 in the Umpqua River. He is the former national fly-casting champion, so he backs up this new instrument with many years of experience in fishing.

He says, "You've got to find the fish before you can catch them, so I have developed a dependable way of locating bass, trout, walleyes, northern pike, muskies and pan fish. I found the favorite water temperatures of all the common freshwater game fish. All smallmouth bass like 67 degrees, and they like it the same across the continent. When the surface water is 60 degrees you will find the smallmouth bass 5 to 10 feet deep, so you must fish for them at that depth. The fish finder gives you a water thermometer and the necessary fish charts for each fish."

Now for another tip on what's really hot in fly fishing. A tough, waterproof thread has been developed that reacts under light in the ultraviolet spectrum. Bathing suits made of the material can be seen at a distance of two miles, and have made quite a hit with some of the more attractive mermaids. Now the material is being used to tie flies that may catch all the trout and bass that swim. At dawn or dusk, in smog or on the cloudiest days, the flies glow as if they're alive and are said to be four times as bright as conventional flies.

Elmer Maywald of Oak Park, Ill., an expert angler and conservation-minded sportsman, last year fished in some of the better streams of British Columbia, Washington, Oregon, Idaho, Montana and Wyoming with his latest fly creation made from the feathers of a horned owl. It took more trout than anything else in his fly box. His hope is that every fly tier will use horned-owl feathers because the more horned owls that are destroyed the better will be the quail and duck shooting. In tying this fly

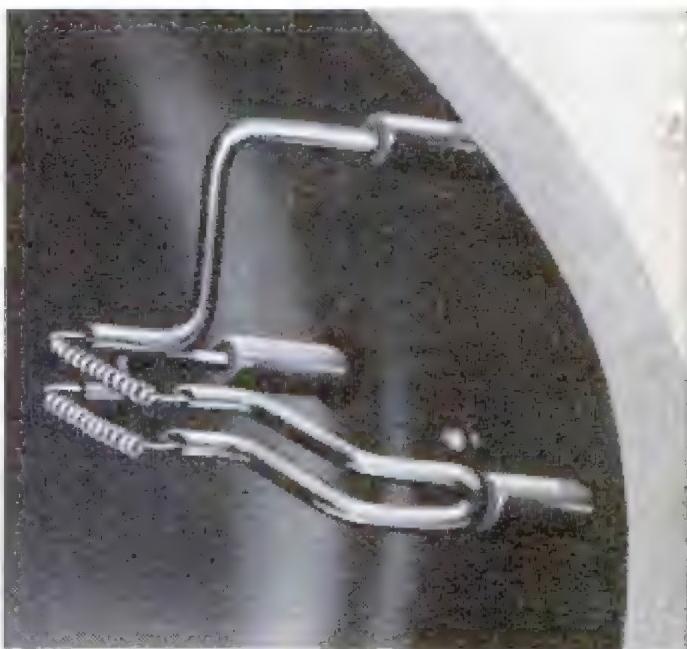
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Why General Electric headlamps give more light

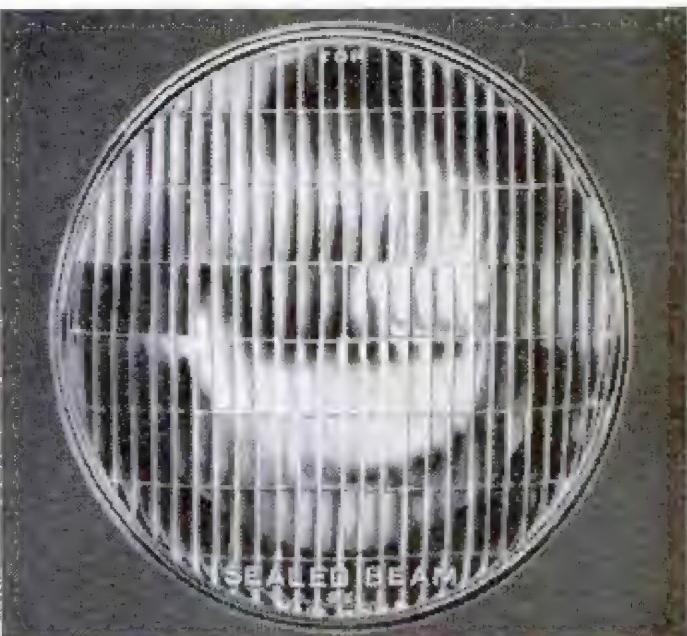
—now 12% more light on the road... and they do not grow dim



1. **TODAY'S GENERAL ELECTRIC "ALL-GLASS"** sealed beam Headlamp is a rugged, one-piece bulb that gives you more light than ever. These pictures show why.



2. **BIG, IMPROVED FILAMENTS** give 12% more light on the road for driving, 16% more light for passing. And they won't shake loose on bumpy roads.



3. **THE ONE-PIECE**, all-glass construction keeps out all light dimming dirt and moisture. The average General Electric headlamp gives 99% of original light output even at the end of its life. *It does not grow dim!*

4. **THE LENS** is rugged hard glass, precision made to put maximum light on the road. Be sure to have your car lights checked next time you leave your car for service. And when you need replacements, make sure you insist on General Electric!

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Here's the rugged steel rod that's delicately balanced, responsive to the touch. Years of experience in tapering and tempering steel give Actionrod a "custom-built" feel just as comfortable as your old fishing hat.

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As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

Refinishing Leather Upholstery

Q—I have a large leather-upholstered chair. The upholstery is rather worn at the corners of the cushion and on the tops of the armrests. There are a few small cracks at these points but they do not seem to go clear through the leather. Is there any way of refinishing leather upholstery to make it look like new? **D.A.**—Richmond, Va.

A—If you are sure that your chair is upholstered in genuine leather and not the so-called imitation leather or other types of leather substitute, then the question of whether or not it can be successfully refinished depends almost entirely on the extent and nature of the wear or other defects. Special enamels and dyes are available in a wide range of colors and are easy to apply by following the manufacturers' directions. The colored enamels are more or less opaque and are quite effective in hiding ordinary defects. The dyes color the material without entirely hiding the characteristic texture and graining of the leather. It is very important that all surfaces of the upholstery be thoroughly cleaned before either of these refinishing materials is applied.

Fireplace Smokes

Q—Recently I moved into an old house having a large stone fireplace in the living room. This fireplace smokes badly when either wood or coal is burned. The flue seems to be clear of obstructions. Fireplace opening is about 36 in. high. What could be the cause of this trouble?

B.G.—Portland, Me.

A—When you say the fireplace "smokes badly" we assume you mean that it smokes continuously and not just intermittently or when the fire is first lighted. Two quite common causes are suggested by your description. The first is that the flue is too small in sectional area. It should be not less than one tenth the area of the fireplace opening. A square flue generally seems to give better results than a rectangular one. The other possibility is that the wind shelf either is not properly located or constructed, or it is filled to the outside edge with an accumulation of fine ash, soot and very likely bits of mortar that have fallen from above. The purpose of the wind shelf, of course, is to prevent back draft. If it is covered with debris

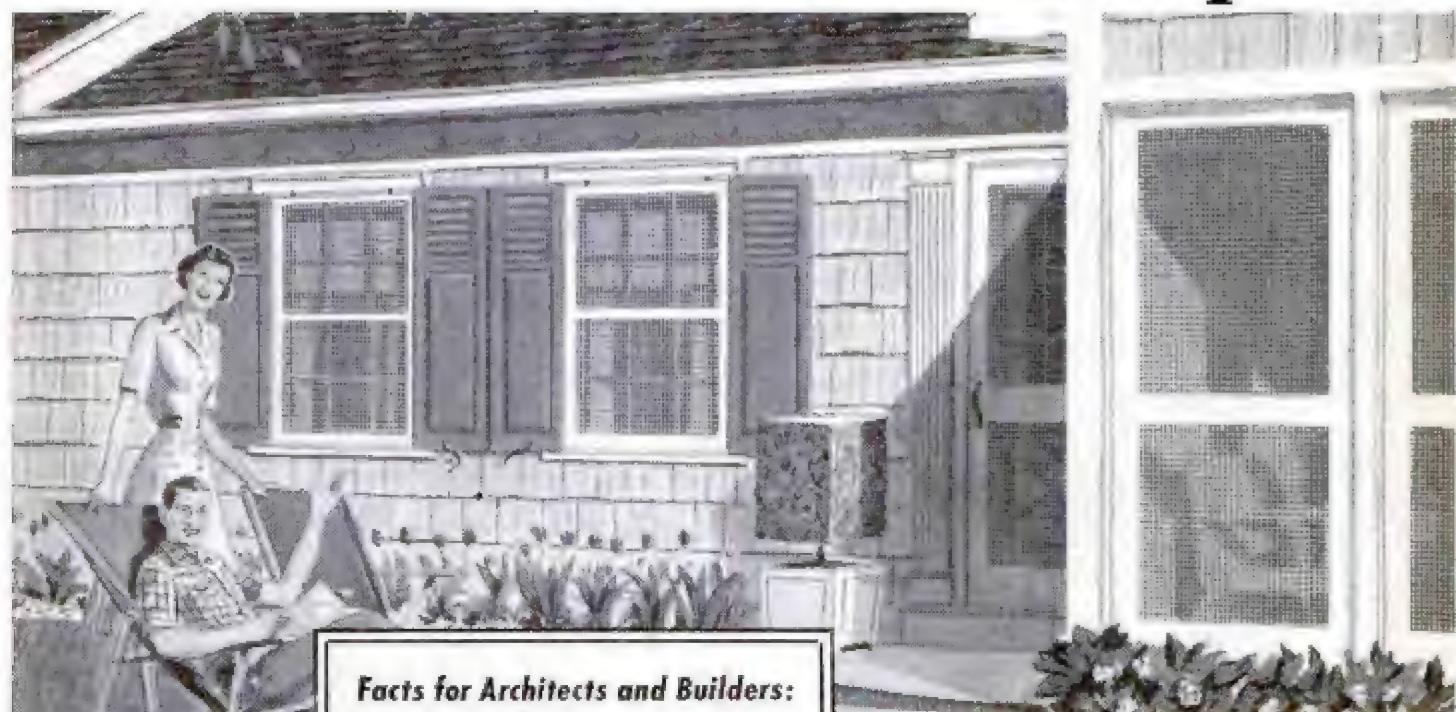


(Continued to page 250)

Amazing new LUMITE screening

STAINPROOF

Because it's Rustproof!



Facts for Architects and Builders:

Effect of acids, alkalis and solvents—Essentially none.

Effect of age—Independent scientific tests indicate that LUMITE is more durable than any other type of screen cloth under all climatic conditions that might normally be encountered.

Non-inflammable—Will not support flame . . . is self-extinguishing. Melting point, 340 F. **Tensile strength**—Up to 40,000 lbs. per square inch.

Impact strength—Greater than conventional screening.

Installation—Cut with ordinary scissors. Fold cut edges under one-half inch. Tack or staple the screening smoothly and evenly every 1½". Because of inherent characteristics LUMITE will gradually draw itself into a snug, firm fit. For correct methods of machine framing, consult LUMITE engineers.

LONGER-LASTING

CAN'T STAIN YOUR HOUSE!

CAN'T RUST OR CORRODE

Imagine a screening that can be GUARANTEED never to rust, rot, corrode or stain your house—yet costs only 11½-12¢ per square foot. That's LUMITE!

Imagine a plastic so strong that it actually has greater impact strength than any other type of screening. That's LUMITE!

Imagine a screening that never needs painting to protect it from rust or corrosion. That's LUMITE!

Imagine a screening that is so easy to handle anyone can frame it—no special tools needed—will never sag or bulge when properly framed. That's LUMITE!

For your new home or to replace old screens, order LUMITE from your hardware, lumber or building supply dealer.

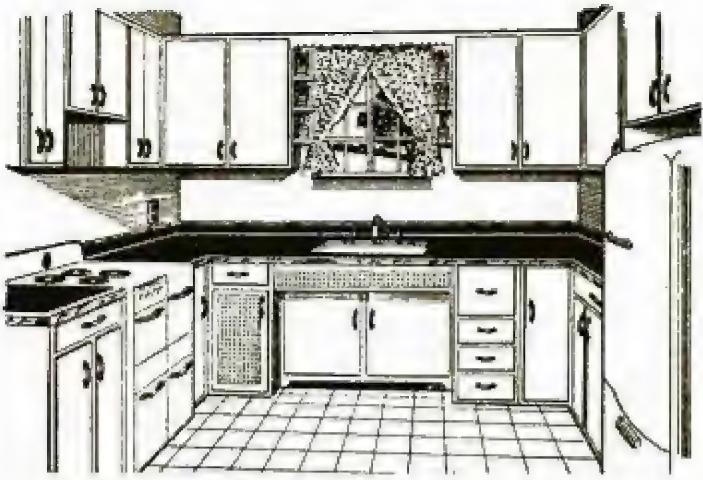
Write for information and free sample to Dept. PM-2, LUMITE DIVISION, Chicopee Manufacturing Corporation, 47 Worth Street, New York 13, N. Y.

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Includes complete assembly illustrations and step-by-step directions. **FULL SIZE CABINET CONSTRUCTION PATTERNS** make *entire* kitchen modernization an easy job!

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or is too narrow, it could be the cause of an almost continuous back draft, forcing smoke and gases into the room. A thorough cleaning of the flue and wind shelf, and the installation of a damper, if there is none, might help to correct your trouble. However, if the flue is too small or the wind shelf too narrow, rebuilding is the only sure solution.

Refinishing Ornamental Iron

Q—The ornamental-iron railing on my front stoop is rusty in spots and the paint is scaling off on the lower portions, exposing the metal to the weather. Can I refinish these railings myself in a dull black like the original finish? F.M.—Toronto, Ont., Can.



A—Yes, the actual refinishing is quite simple, the main problem being the thorough removal of the rust and scale. A stiff wire brush is quite effective for brushing off the rust and scale but you may have to use a coarse file to bare the metal on some parts of the railing. After a thorough wire-brushing, clean off all dust and loose material so that it will not be picked up by the brush and spread with the paint. As soon as the work has been cleaned, it should be immediately coated with a protective primer before the bare metal is exposed to moisture. Either a brushing red lead or tinner's red lead makes a good metal primer. Be sure to allow the primer plenty of time to dry thoroughly, and then apply a coat of flat-black paint. This dries without any sheen or gloss and makes a very attractive, durable finish.

Cleaning Shellacked Floors

Q—My hardwood floors are shellacked and waxed. Now the finish has gotten grimy and dull. I have been told to use a dry-cleaning fluid to remove the old wax and grime, rather than a washing solution. Is this correct? R.M.—Kansas City, Mo.



A—Yes, insofar as the superiority of the cleaning fluid over washing-powder solution as a cleaner is concerned. However, we cannot recommend the use of cleaning fluid in any room in the house as the fire and health hazards are too great, even with all doors and windows open. Water in the washing solution may turn the shellac white on any areas where the wax film is worn off. With ordinary precautions, turpentine can be used safely to remove the old wax. Have the doors and windows open when applying the turpentine and for some hours after to allow the fumes to pass out. Embedded grime not removed along with the old wax can be removed with a household paint cleaner before refinishing the floor.

Repairing Chairs That Squeak

Q—I have several older-type dining chairs with hardwood frames and backs. The joints of all the wooden parts are loose and squeak annoyingly when the chairs are in use. How can I tighten these loose joints—should I take each chair apart and reglue the joints, or is there a simpler method? Would I have to use clamps? R.R.—Denver, Colo.

A—The best method, of course, is to disassemble the chairs completely, clean all the old glue out of the joints and reglue, clamping the joints under pressure until the glue is dry. Use care when taking the chairs apart so as not to split the wood. Frequently, the parts of older chairs were joined with dowels and special care must be taken not to break these. To reassemble each chair as a unit, you will need at least four bar clamps. On some chairs, six bar clamps will be needed. Otherwise the chair must be joined in sections, allowing the glue to dry each time.

THE BORDEN CO. • CHEMICAL DIVISION
Makers of Casco Glues

HERE'S HOW TO END

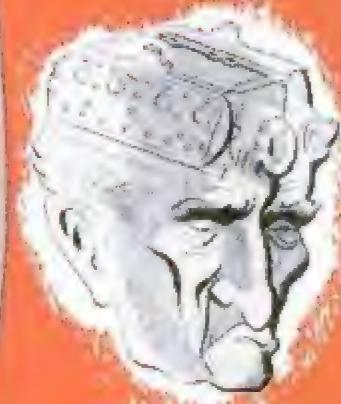
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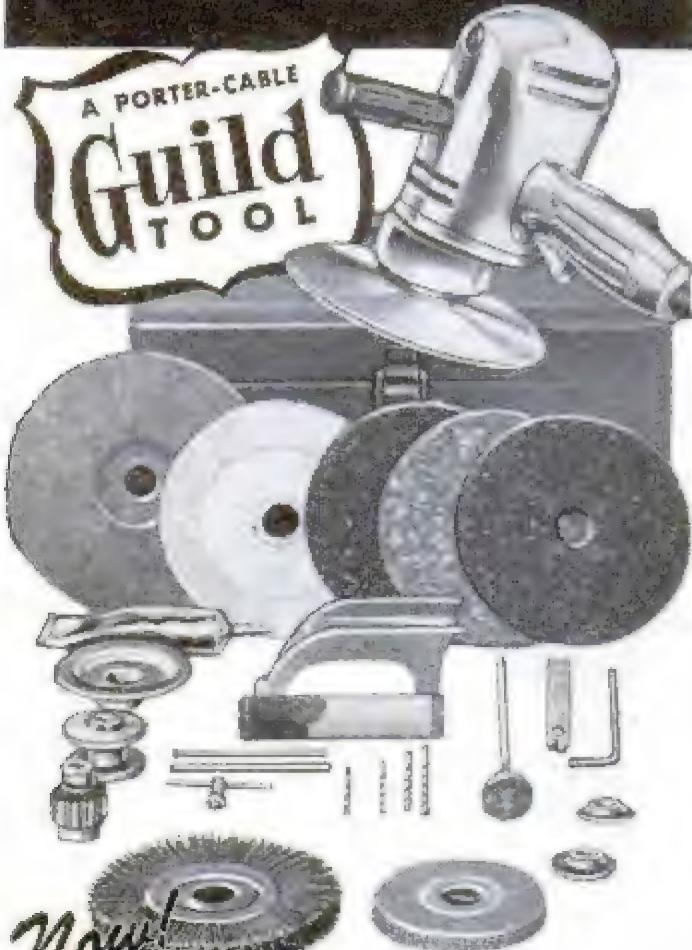
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Now!

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he uses the feathers off the shanks of the feet for the body, and the hackle comes from the face of the bird.

What looks most important to the fish is the fly. It takes a good fly, properly presented, to get the best out of fly fishing. Fly tying is not just a fad of fishermen; it's a hobby that has lured doctors, presidents, baseball players, lawyers and industrialists away from their work. Every American town in a trout-fishing area possesses a fly tier or two and the big cities are crowded with them. In fact, the bug that bites the fly tier produces a fever every bit as serious as the disease that strikes millions of fishermen as soon as the season opens.

(To be continued)

Smog Sleuths

(Continued from page 181)

operating in Los Angeles because of canceled flights due to smogged-in airports. To find out what smog does to visibility, the technicians built a transmissometer.

Patterned after one developed by Dr. N. E. Bradbury of Stanford University, it consists of a photoelectric cell mounted in a box along with a light which sends out a beam that is reflected back with a mirror to strike the photocell. The photoelectric cell registers the amount of light cut off by foreign particles in the air and gives an exact measure of visibility.

A perforated disk whirling in front of the bulb in the transmissometer chops the light beam into 1050 flashes per second so that the photoelectric-cell amplifier, tuned to pick up only this frequency, does not register any other light.

When the transmissometer is used in the laboratory, the light beam is directed through a 40-foot tube containing test-smog vapors. By testing separately each element of the smog, the scientists can find out how much each contributes to reduced visibility.

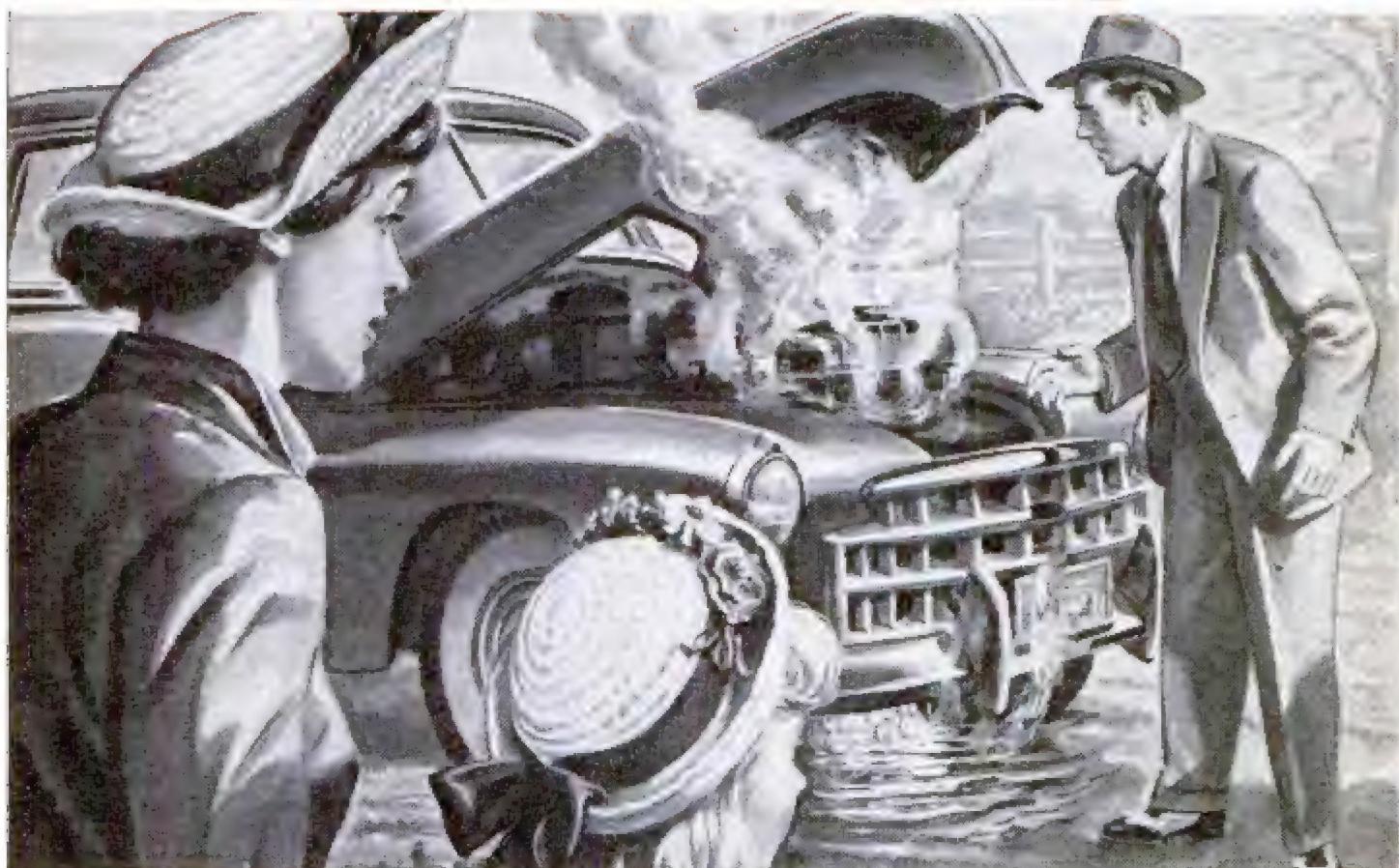
"From what we have found out about smog so far, we know that the conditions which cause smog are the same almost everywhere it occurs," stated one of the scientists.

"First, there must be a heavily industrialized area to provide the necessary smoke and fumes. Then, a meteorological "roof" or inversion layer must be present to prevent the smoke and fumes from escaping, and the wind must be stagnant, or nearly so, to keep the air from circulating and blowing the smog away."

Los Angeles makes a good smog laboratory because it has a large industrial area

(Continued to page 254)

Don't let a rusty radiator take you for a costly ride



Rust-clogged radiators cause overheating, trouble and expense



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... Through Chemistry

Clean out rust with

DU PONT COOLING SYSTEM CLEANSER

Get rid of winter's accumulation of rust, scale and scum . . . avoid damage caused by overheating. Just pour a can of DU PONT CLEANSER into your radiator, run the engine 30 minutes or more, and drain. It dissolves rust—cleans thoroughly—improves the engine performance. It's safe, sure and easy to use.

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You can stop leaks quickly and securely—and help to prevent radiator leaks in the future—by pouring in DU PONT COOLING SYSTEM SEALER. It will not clog the radiator or harm hose or metal parts.



**What a difference a
real hand sander
makes!**



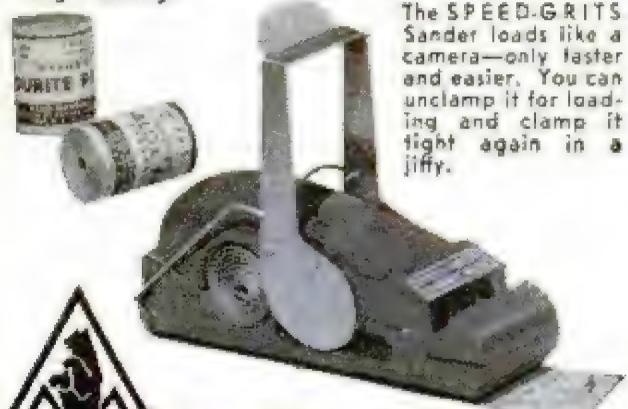
The NEW **SPEED-GRITS* SANDER**

A real professional-looking finish in a fraction of the required time by the old-fashioned wooden block. Fast on the flats and in the curves and corners too. That's the story of the new SPEED-GRITS Sander, the tool that handles like a plane.

It's light in weight but strongly built and it grips the sandpaper like a bulldog so it can't slip, loosen, snag or tear.

Best news of all is the low price. In two sizes—large size, with sanding area of 7" x 2", is priced at only \$1.25. Slightly smaller size costs \$1.00. Ask to see the handy SPEED-GRITS Sander at your local hardware store. You ought to have one in your shop.

* Reg. Pending.



and all the meteorological conditions necessary for smog formation. Los Angeles County is rimmed on three sides by high mountains and is located directly beneath the lower lip of a huge tilted saucer of air extending out over the Pacific Ocean to the Hawaiian Islands.

Whirling in a huge clockwise circle, this high-pressure system pours a cascade of warm air down on the California coast. Often 20 to 30 degrees warmer, the air forms a ceiling directly over the Los Angeles basin, floating above the cool air which fills the basin.

Contaminated air from the city below is unable to rise through this inversion layer which hovers between 1000 and 3000 feet above the ground. The natural haze of dust, salt particles and water droplets which collects at this layer is increased by man-made smoke and fumes, spreading a blanket of smog over the city. When the smog reaches ground level, eyes begin to smart and noses and throats burn.

The Stanford Research Institute scientists are working to perfect a smog-forecasting technique. With the help of a 36-foot chart on which they plotted two years of weather data from Los Angeles, they computed the Stanford Research Institute Smog Index. In its present state of development, the smog index helps meteorologists predict smog two days in advance with fair accuracy.

Forecasting smog is important because it will then be possible to limit the amount of smoke and fumes poured into the air when smog is expected. This knowledge may prevent a recurrence of the tragedies which struck the Meuse Valley and Donora.

Hollywood Boatman

(Continued from page 160)

oarlocks, building a false cabin and adding figureheads.

He recalls one picture where a Hollywood flunky ordered a particular type of boat. Roberts knew it wasn't the right kind. He tried to say so, but the obnoxious underling insisted, "That's what the head man ordered and that's what he'll get."

Roberts shrugged his shoulders and delivered the boat. As soon as the director saw it he threw up his hands. "Utterly impossible!" he moaned. "It hides all the actors. We need a speed boat, not a cabin cruiser. How long will it take us to get a speed boat up here?"

"Give me a carpenter and I'll have one for you in about five minutes," Roberts said. He and the carpenter went to work, loosened a dozen screws and lifted the

(Continued to page 256)

Success from the start!

*Sets New
Performance
Standard*

*Amazing Resistor
does it!*



Here's what it does

A SMOOTHER ENGINE IDLE—
WIDER SPARK GAP HELPS
ELIMINATE OCCASIONAL
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IMPROVED GASOLINE ECON-
OMY—PERMITS BURNING OF
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4. Easy Adjustment.
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7. Micro-Lap Mirror-Like Finish on Anvil and Spindle Ends.

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Saginaw, Michigan

cabin off. The result, an open-cockpit speedboat, which the director had wanted all the time.

With a little ingenuity, a boat used in one film can be remodeled to fit an entirely different type of picture. The French boats used in "Frenchman's Creek" became English longboats for "That Hamilton Woman." A sloop that appeared in "Lydia" can be changed into a day cruiser, a cabin cruiser, a yacht tender or a motor sailer.

Roberts keeps in touch with several salvage outfits on the West Coast. When they come across something of interest, they ring him on the telephone. He is a voluminous reader of magazines and books—always on the hunt for photos and descriptions of historical or foreign boats.

When he can't buy exactly what he wants, he builds it himself. His Venetian gondola, his English punts and several of his native war canoes are examples. He uses modern boatbuilding techniques and his products are always much stronger and more waterproof than the originals—at the same time duplicating in exact detail the lines and ornamentation.

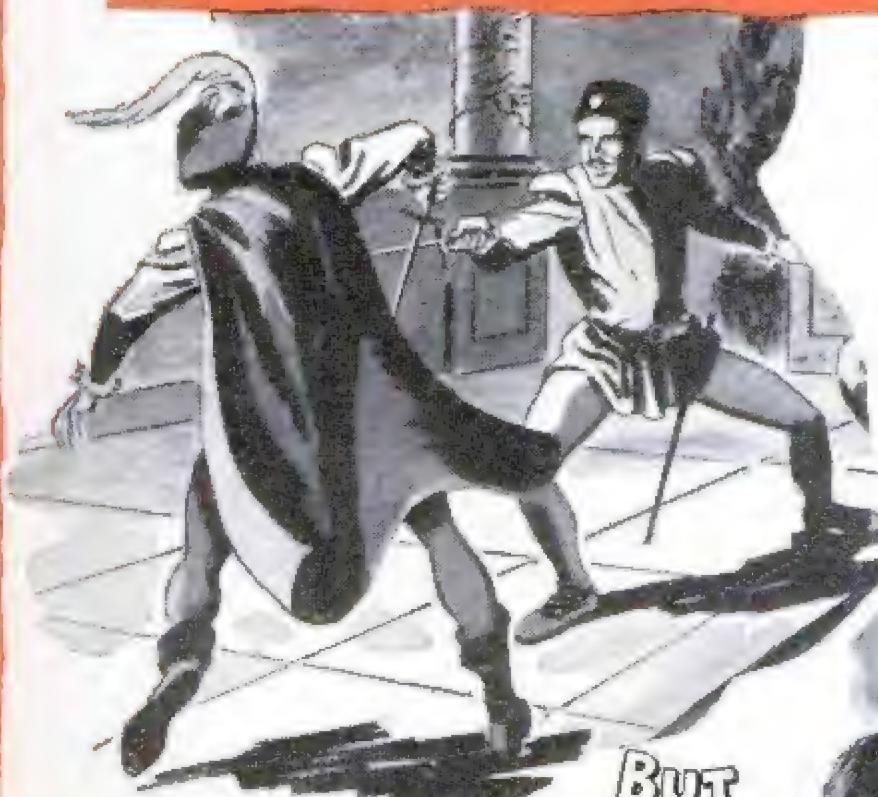
A film company on location in Canada once took some scenes featuring an 18-foot sailboat. Back in Hollywood, it was decided that some additional close-ups had to be taken. It was cheaper to hire Roberts' skill than to transport the film company all the way back to Canada. Working from only a photograph, he constructed an exact duplicate of the sailboat.

On one of his salvaging expeditions Roberts acquired a model of the War of 1812 sailing ship, Peary. He had no particular use for it then, but put it away on the theory that it might come in handy some day. In the picture, "The Beginning or the End," he was called upon to furnish President Franklin D. Roosevelt's study. While doing research for this task, he ran across an item which said that F.D.R. had been given a model of the Peary in 1934. Roberts was delighted to use his own model in the motion-picture reproduction of the wartime President's desk.

Because his boats are bread and butter to him, and because he's often the only man on a set who knows how to handle them, Roberts holds a card in the Screen Actors' Guild and appears in many boat scenes. He's a stocky little guy with a dapper mustache and a twinkle in his eyes. He may be the skipper of a yacht, the driver of a speedboat or the boatswain of the admiral's gig.

Take a good look the next time you witness a sea picture at the movies. You may be able to pick out Benton Roberts, the Hollywood boatman.

The "9 lives" of a cat by Bers



SHAKESPEARE

MENTIONS THE "NINE LIVES" OF A CAT IN "ROMEO AND JULIET"

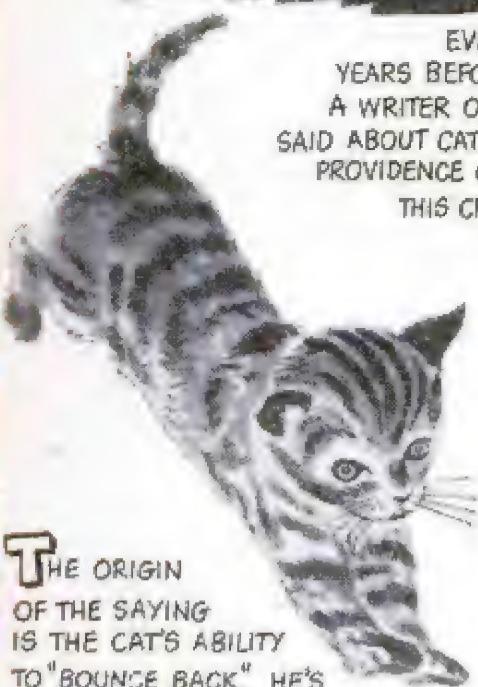
TYBALT: WHAT WOULDST THOU HAVE WITH ME?"

MERCUTIO: "GOOD KING OF CATS, NOTHING BUT ONE OF YOUR NINE LIVES"



BUT

EVEN TWO THOUSAND YEARS BEFORE SHAKESPEARE, A WRITER OF FABLES IN INDIA SAID ABOUT CATS, "IT HAS BEEN THE PROVIDENCE OF NATURE TO GIVE THIS CREATURE NINE LIVES INSTEAD OF ONE."



THE ORIGIN OF THE SAYING IS THE CAT'S ABILITY TO "BOUNCE BACK." HE'S TOUGH AND HARD TO LICK. "EVEREADY" BATTERIES HAVE THE SAME SORT OF "BOUNCE BACK." THEY RECOVER POWER BETWEEN USES... LAST LONGER! THAT'S WHY THEY'RE CALLED THE BATTERIES WITH "NINE LIVES."

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We Built a Cabin for \$300

(Continued from page 93)

adventure for so long, had done so many back-breaking jobs for just this moment, that we refused to be thwarted by the rain that lashed in from the ocean. As soon as the two sections were braced, I tossed a tarpaulin over the top. Then we sought partial protection from the storm, glorying that the roof of our cottage—in part—was over our heads at last.

The old window frames, minus glass and weak in structure, were taken home and glazed, reinforced, puttied and painted during the winter. The two doors, splintered and much the worse for wear, were rebuilt and made ready at home for re-hanging in the spring.

As with all the lumber we had salvaged, the floor and roof boards demanded careful sorting. Roof covering seemed a hopeless problem until I came across a builder who had an odd lot of asphalt shingles that he was willing to sell for a nominal amount. They covered one side of the roof. Over the garage, and later over the living room, we used a good grade of roofing paper that has withstood two winters.

Two layers of flooring were out of the question. Over the one floor we laid building paper and linoleum, which gives us a neat and tight floor. As soon as each wall was erected, my wife puttied and painted, filling cracks and holes. This "face lifting" has given the cabin an atmosphere of sanitation and beauty. Outside, the woodwork is white with yellow trim; inside, each room is finished in some pastel shade. The ceilings are white.

Critics might remark that I did not build the cabin according to conventional methods. Under the circumstances, the method I used—putting together the walls and then the roof—was most satisfactory. During the first winter, when we kept at the job every week end, we set up a wood stove in the kitchen with a stovepipe protruding through the window opening. It was crude, but we never suffered from the cold.

We were well satisfied with our first year's progress, for now we had a kitchen, bedroom and large garage. We started the second year with a summer of loafing, swimming, boating and fishing between bouts of work.

This year we confined our activities to the utilities—plumbing, heating and lighting. Our first move was for a better method of heating. A chimney and fireplace were in order. We also wanted a living room. And we built in a toilet, since town water now was available.

(Continued to page 260)

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can always depend upon...
the consistently high qual-
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GUM**

It's "Always Refreshing"

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The spark of good-fellowship flashes nowhere more brilliantly than on American highways—in the hearts of the men who drive our trucks. Courteous, skillful, responsible, they are a class of men whose opinions on spark plugs can be highly regarded. Independent surveys taken among them show that they prefer and use Champion Spark Plugs in vast majority, because they represent the ultimate in quality, value, performance and dependability.

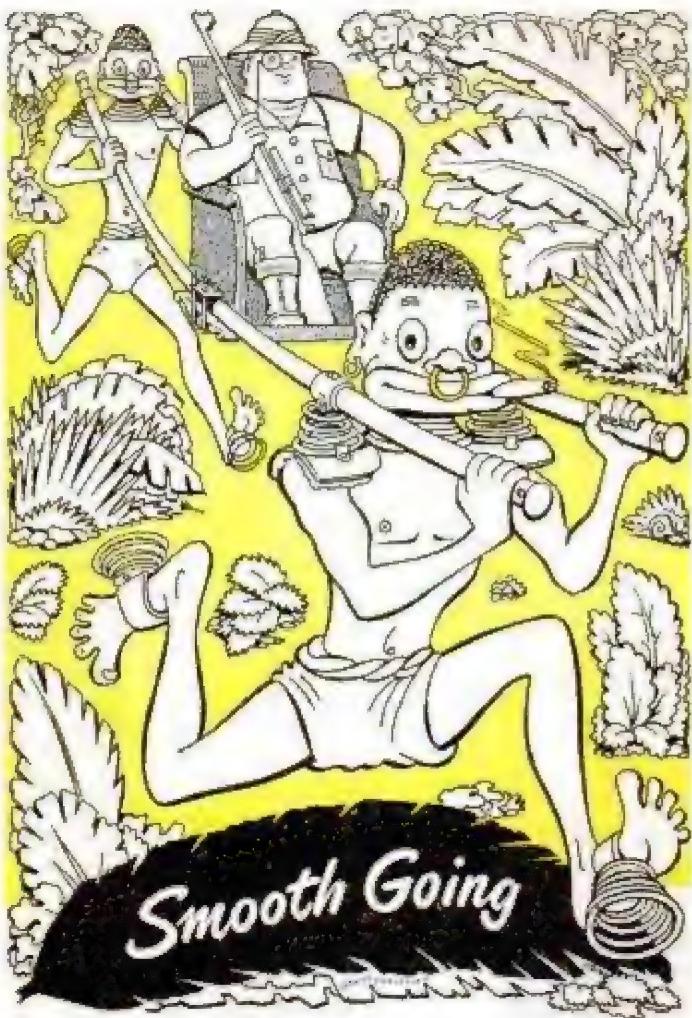
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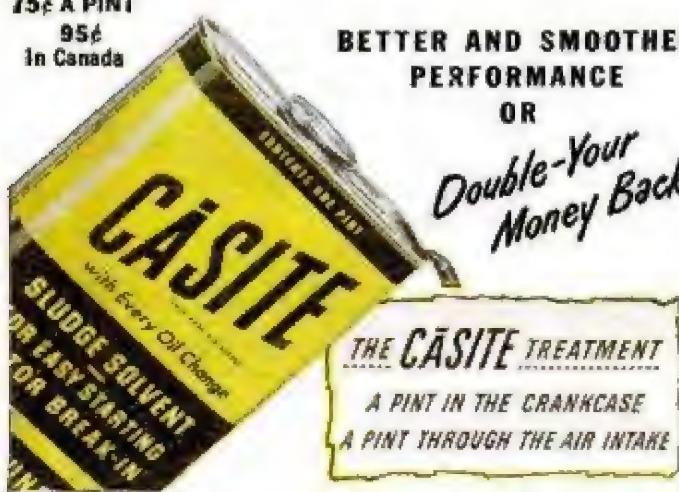
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BETTER AND SMOOTHER
PERFORMANCE
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*Double-Your
Money Back*



Months before, we had laid the chimney foundation so that the back wall of the chimney would be a part of the garage rear wall. The wall was completed with odd pieces of siding and a small door as passageway from the garage through the living room (porch) to the beach path. Fortunately white brick, cement and flue lining were plentiful and inexpensive. Many of the stones in the foundation and face of the chimney and hearth came from the beach and highways. Total cost of chimney and fireplace, including damper, lead and hard brick, was not over \$35.

The fireplace was faced with field stones, some of them brought to us by an interested friend from his own stone wall. We enjoyed putting them in place a few at a time, building up the pillars and arch like a jigsaw puzzle. Every stone belonged somewhere. We played along until we found that place. How did I know about building chimneys and fireplaces? Years before, a mason built my first fireplace. It smoked like Vesuvius. So I made a point of learning from a more capable mason all the tricks of the trade. The first fireplace I built worked, and so have the several I've laid up since. Bricklaying is play. Even my wife took to this job and turned out excellent work. Because we once more were out of lumber, we decided to build the living room of bricks. My wife laid up most of the bricks that went into outer walls while I was framing the roof.

To return to the fireplace. Hard brick for back and arch; for the hearth, flat stones from the beach laid in a bed of mortar and pointed up with a straight mixture of cement to which yellow ochre for coloring had been added. Above the mantel, where the chimney bricks were exposed, a stronger mix of cement and sand was used. I fashioned the mortar with a trowel to resemble Spanish stucco. On the garage side, a rough mix of sand and cement was wiped over the bricks to seal every possible crevice and guard against fire.

For the mantelpiece I adzed a wide oak log and pinned it to some base pieces mortared into the fireplace, leaving the wooden knobs of the pins sticking up slightly, like old ship trunnions. The fireplace solved our heat problem. A hole was left on the garage side, into which we have inserted a pipe for the wood stove which we use when we need extra heat. Were we to use the cabin in extremely cold weather, we would set up a coal stove from which we would run pipes to the other rooms.

Plumbing problems could not be solved without the expenditure of real money, we

(Continued to page 262)

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long and 24-inches di-
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thought, until we discovered that the plumbing-supply houses couldn't supply us because there was still no open market for the non-GI. Once more we were on the hunt, and found at low cost a hopper and box, old-fashioned but in good condition; we also found second-hand iron and brass piping, and at long last, the necessary fixtures to complete the installation, along with a secondhand bathroom sink. An iron kitchen sink, apparently useless with rust, was salvaged from the original cabin. This was scoured, given three coats of enamel and placed in a framework of shelves and cabinets. The shelves, covered with linoleum and edged with chromium, make a modern and sanitary ensemble. An old faucet, chromium-plated at a cost of 75 cents, completes the up-to-date kitchen.

Our only labor bill, paid to two chaps who dug the ditch for water pipes, the foundation for the porch and the cesspool, was \$25. The cesspool was built of white brick—an experiment on my part since cesspool bricks were too expensive and chipped stone not available. I left spaces between the bricks, shaping the walls inward to a three-foot opening with a cover of concrete, an iron ring in the center. On top, to camouflage the cesspool, stands a birdbath made of concrete.

Now for our living room (or glassed-in

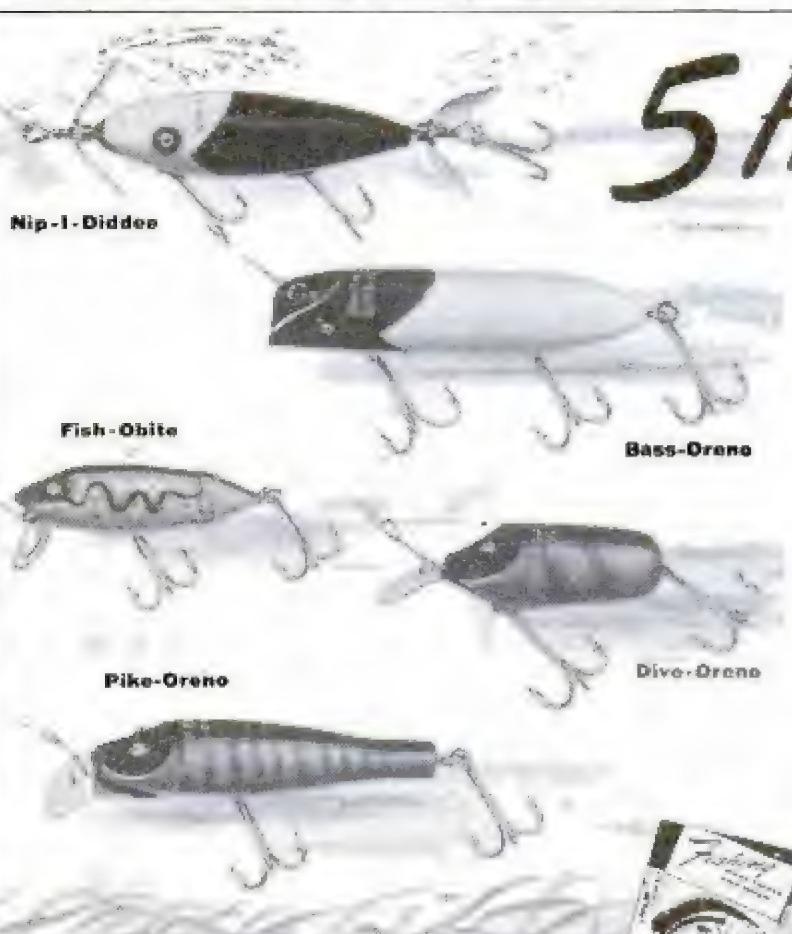
porch). Very little of our lumber was left, nor could we buy any. After some maneuvering, we finally acquired what is the most attractive room in the cabin. A 12-by-14-foot foundation was dug, a one-foot concrete wall was poured along the outer sides, and then the area was filled with gravel and stone and covered with a three-inch concrete floor, marked off in the four compass directions. In the center is a three-foot circle on which we will paint a compass card. We used oak for plate and corner posts, which we covered with wire lath and stuccoed inside and out. Seven four-light storm windows were inserted through which we obtain a view of the ocean and islands second to none. The small wall space is brick, laid by my wife and painted cream inside, white outside.

The walls of the toilet are covered with Rocklath and washable paper. An outside faucet serves bathers and gardener.

Wiring the house was perhaps the quickest job. The electric company attended to all outside work except placing the outlet box in combination with the switch box and the rigid conduit outside. The meter box was furnished free. The task of running the three wires through the weather head into the conduit and to the switch box was simple. Checking the neutral service

(Continued to page 264)

5 Fish Foolin' Baits



FREE! New Book on Fishing

Every fisherman needs "Fishing—What Tackle and When." 76 pages of fishing hints, tackle, etc. Write for it now! FREE.
South Bend Bait Co., 891 High St., South Bend 23, Ind.

It's their tantalizing action—their lifelike finish that fools the big boys. For fish you can brag about, get these 5 baits.

No. 910 Nip-I-Diddee—new, semi-weedless, surface bait—effective action. **\$1.25.**

No. 973 Bass-Oreno—world's greatest and most imitated fish-getter. **\$1.10.**

No. 952 Dive-Oreno—deep diving, fast-action bait that goes down and gets 'em. **\$1.25.**

No. 1991 Fish-Obite—insured to catch fish, casts and trolls perfectly. **\$1.25.**

No. 956 Pike-Oreno—travels deep with irresistible wiggling minnow action. **\$1.25.**



Perfectoreno Reels—no backlashes. **\$10 up.**
Black-Oreno—line you can trust. 50 yds. **\$1.20 up.**
Excel-Oreno—finest of fly lines. **\$1.85 up.**

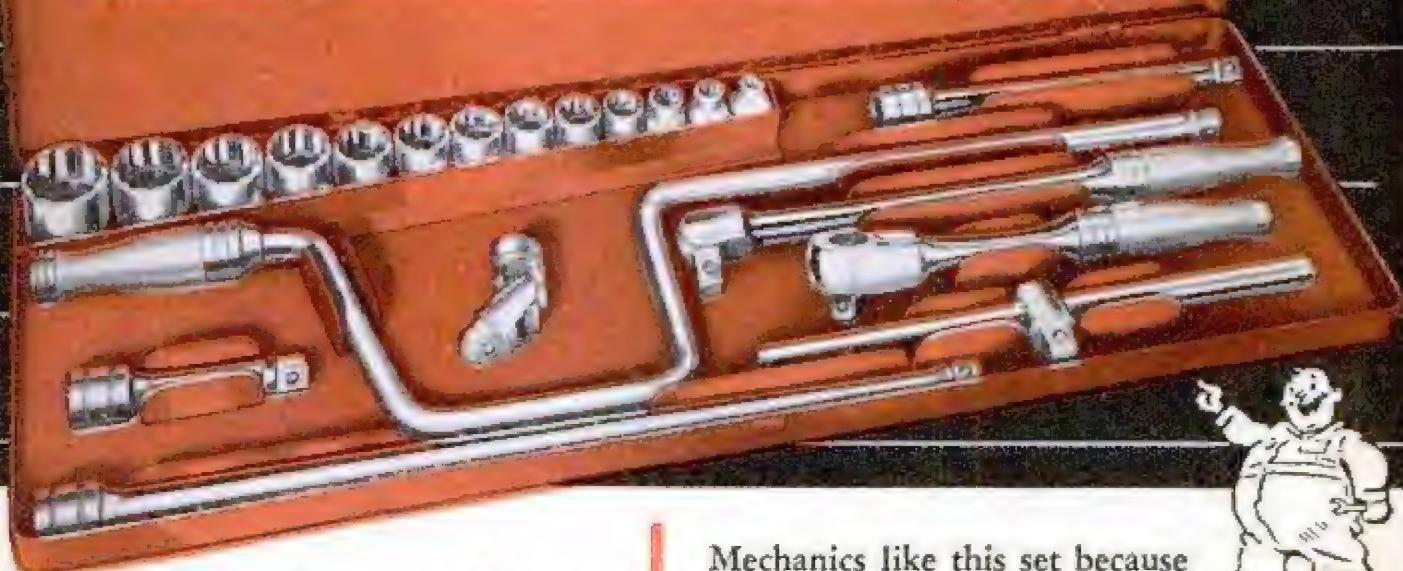


Snap-on Famous Ferret Set



Rugged tools . . . twice as strong as you would expect such slim, streamlined handles and thin-walled sockets to be.

"The Choice of Better Mechanics"



Present Owners:
Supplement your basic set with these Special Ferret tools . . .

CLUTCH-TYPE SCREW DRIVER



Handles clutch-type (figure 8) head screws. Built short for easy operation in close quarters.

RATCHET ADAPTOR



Converts any combination of Ferret handle, extension and socket into a reverse action ratcheting tool.

PLASTIC GRIP HANDLE



A shockproof, plastic handle, $5\frac{1}{4}$ " long that is ideal for electric work. Makes your Ferret Set more useful.

DOUBLE HEX FLEXOCKETS



Saves a lot of tough work fumbling for hard to get at studs and bolts. Eight sizes: $\frac{1}{8}$ " to $\frac{3}{4}$ ".



FERRET FLEXTENSION — A flexible steel cable extension connects handle and socket to work around corners and over obstructions.

EXTRA LONG FERRET SPEEDER

$36\frac{1}{2}$ " long, 27" shank. Radius of sweep is $3\frac{1}{4}$ ". "Palm-Grip" handle rotates to provide easy operation.

Mechanics like this set because it is way over par in performance . . . the tools are strong and easily adaptable to a variety of jobs.

They squeeze into tight places and get those hard-to-reach nuts and bolts that defy the ordinary type wrench. Recently designed by Snap-on engineers, they have the new features that make fast, easy work of the tough jobs.

INCLUDED IN THE SET: $\frac{1}{4}$ " and $\frac{5}{16}$ " single broached sockets; 11 double broached sockets from $\frac{3}{8}$ " to $\frac{1}{2}$ "; a speeder wrench, sliding tee, 8" reversible ratchet, nut spinner and universal joint, plus a 3", 6" and 12" extension. All complete in a metal box for only

\$27.65

SNAP-ON TOOLS CORPORATION
8062-D 28th Avenue, Kenosha, Wisconsin

Enclosed find check Money Order or
 Company Purchase Order for the \$27.65
 Snap-on Ferret Set.
 Please send illustrated brochure describing
 109 individual Ferret units.

Name.....
 Address.....
 City..... State.....

This glorified magnet is the stator from a Hoover Motor. It is electrically annealed after punching, then dipped in high-grade varnish and baked under infrared lamps on a continuous conveyor.



WIRY

The good looks of the component parts of Hoover Motors show the fine workmanship built into them—precision-wound coils, miles of wire dedicated to smooth, cool, dependable performance in continuous operation. Made by the makers of the world-famous Hoover Cleaner. Order today from your nearest dealer for immediate delivery.



HOOVER MOTORS

Made in capacities of $\frac{1}{4}$ to $1\frac{1}{2}$ H.P.

The Hoover Company
Electric Motor Division, North Canton, Ohio

wire and seeing that the entrance setup was well grounded were important jobs. B.X. was difficult to obtain, but I hunted until I found enough for my requirements. We installed outlets for refrigerator, stove, toaster, iron and various lamps. There are two outlets in the bedroom and several in the living room. The only fixed light is in the bathroom where we also have a plug for razor and heater. The garage has several wall plugs. At the end of the flagstone walk from porch door to path is an odd-shaped cedar post on which hangs an electrified ship's lantern. Total cost—\$18.

Another important suggestion is this—use pine slabs. One trailer load, costing one dollar, has been used for boarding-in eaves, for corner trim, casings around windows, trellises and moldings. Cut and planed with power tools, the wood finishes satisfactorily and is a tremendous saving over the cost of finished lumber bought from a dealer. Many of our finishing touches, such as the birdhouse, window boxes and trellises were made with wood that might have been used for firewood.

Soon we will install a cupola—a six-sided, glassed-in enclosure on the roof, from which we can scan the entire horizon. This latest venture illustrates why our method of building is so intriguing. There's always something more to plan and build.

It has taken us two years of week ends to complete the cabin as is. We now have forgotten the back-breaking jobs and are proud to share our beauty spot with our friends. Perhaps if we built now we would not be forced to tear down an old structure to obtain our lumber. It still would be a definite method of saving a great deal of money.

But this project has not saved us money alone. It has made possible a cabin which we could not have had otherwise. It has given health and strength to both of us. True, we were dead tired at the close of each working day, but when I look around at men of my age (soon leaving the fifties behind) and realize how "soft" many of them are, I am thankful that my impulse is to work.

There is, most of all, the joy of accomplishment, the pride in seeing a dream come true through one's own efforts. And the thrill of each accomplishment is repeated again and again, until the cottage becomes more precious to its owner than the castle of a king.

Almost 24,000,000 tons of concrete—about the amount required for a four-lane highway connecting Chicago and Mexico City—were used in the construction of Grand Coulee Dam.

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with the new **HYDRA-GLIDE FORK**



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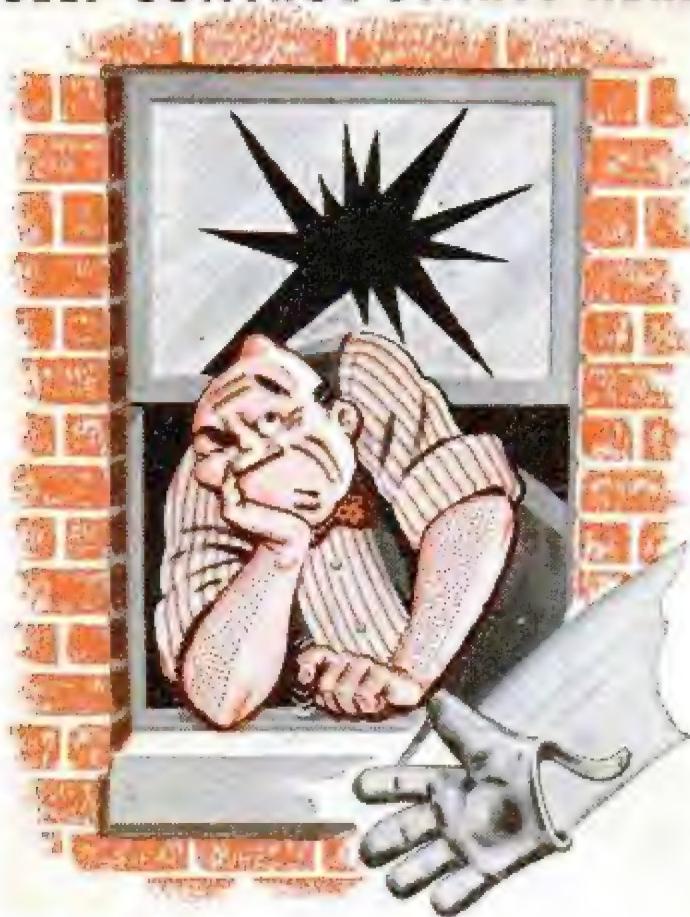
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CAR PERFORMANCE

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ENGINE CONNECTING ROD BEARINGS

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(Division of Federal-Mogul Corporation)

COLDWATER, MICHIGAN



FEDERAL
Mogul

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WHERE IT STARTS—WITH

FEDERAL-MOGUL

BEARINGS

1899 • 50 YEARS' CONTINUOUS BEARING EXPERIENCE • 1949

Moving Day for the Parabeavers

(Continued from page 134)

tend to increase along streams that contain beavers. Brooks that would dry up in the summer often flow all year around because of percolation from the dammed waters. Wells that go dry in the summer hold water all through the year when beavers are planted on adjacent streams.

The trouble is that a beaver sometimes selects a dam site that happens to be on a farmer's land and the farmer has decided for himself just where he wants the water level of his stream. He doesn't want a dam placed where its pool will flood his meadows or turn a dirt road into a morass. Nor does he care to have beavers whittle off all his fence posts close to the ground, as has happened. He doesn't want them prowling into his orchard to cut down valuable fruit trees which they seem to fancy.

A beaver-conservation program that pleases everyone is difficult to plan but after some trials and errors the Idaho State Fish and Game Commission has developed a program that works very well. Early in the century very few beavers were left in Idaho; now the state has a beaver population estimated at around 90,000.

The program is administered by John W. Smith, state fur supervisor, and consists of an allotment system by which a number of carefully selected trappers are allowed to take nominal numbers of skins every year in return for caring for the beavers in their districts. The purpose of the plan is to build up the population to its greatest practical size, estimated at 200,000, and at the same time to contribute fur to the market.

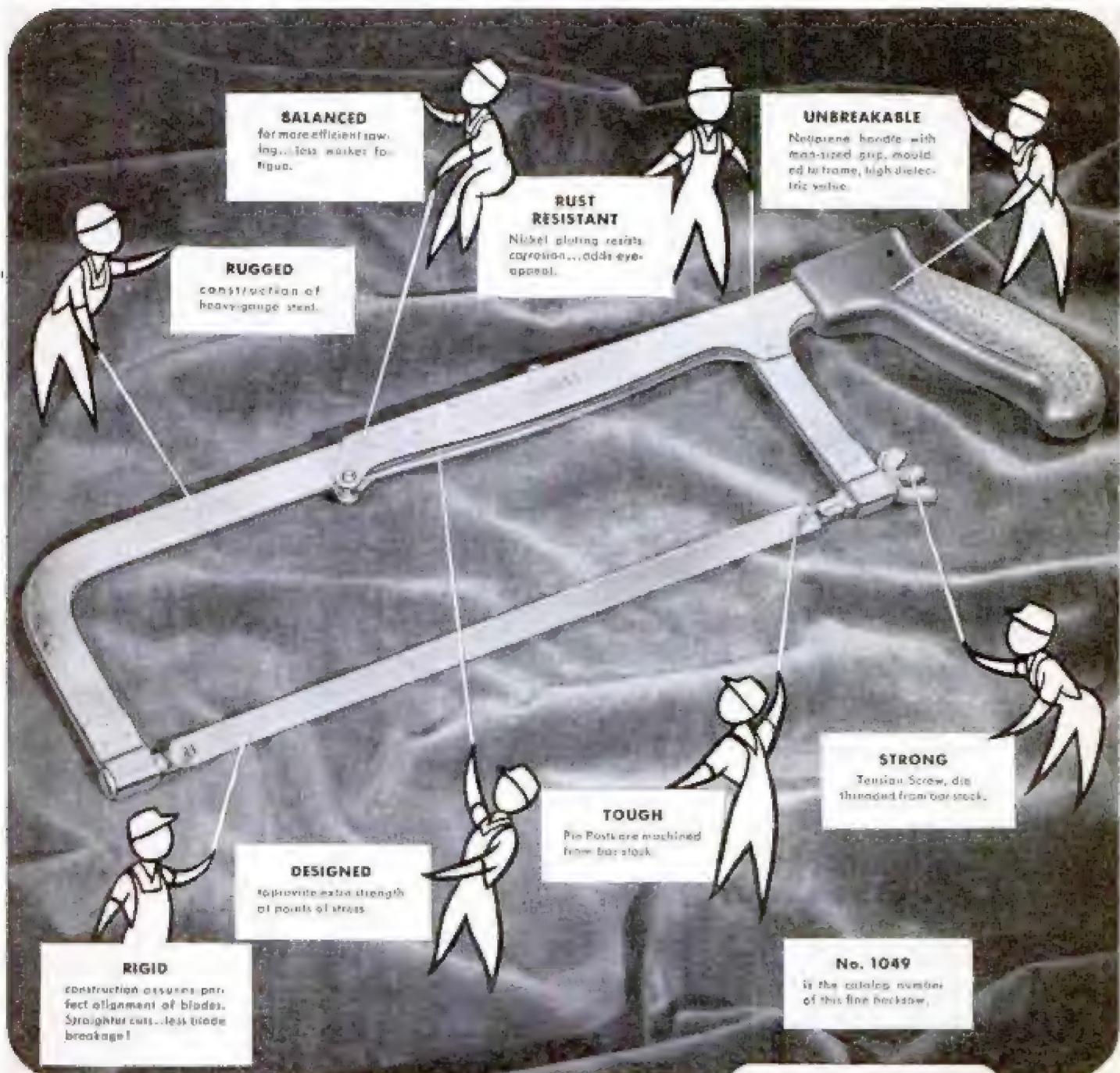
Most of the men chosen as beaver caretaker-trappers are professional trappers who are especially licensed by the state. Each is allotted a beaver district that consists of a natural watershed or a portion of one, amounting to several hundred or several thousand square miles. Part of the caretaker's duty is to live-trap beavers on the streams that have the greatest population and to transplant them on other streams in his area. Too, he takes care of all complaints by removing animals that are doing damage in rural sections. In return, he is allowed to trap for himself a number of beavers during the winter months when the fur is prime. The number runs from less than 100 to possibly more than 150 skins, depending on the local population and its rate of increase.

The skins are auctioned off by the state and the proceeds are divided 75 percent to the trapper and 25 percent to the state. Prices may average more than \$30 per skin

(Continued to page 269)

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RECOGNIZE
QUALITY**

} by these fine features in a
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**EVERYBODY
RECOGNIZES
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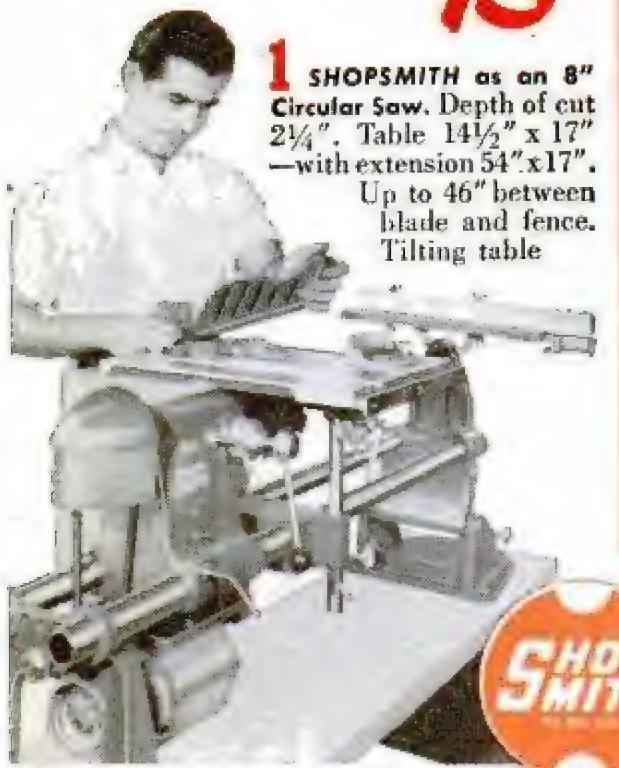
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is a complete power-tool shop
—run by one motor

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COMPLETE ONLY

\$159.50

with $\frac{1}{2}$ h.p.
ball bearing motor
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San Francisco 4, California

Please send descriptive folder on **SHOPSMITH**
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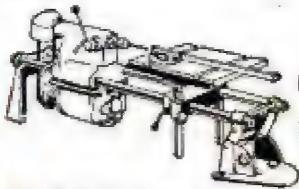
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2 **SHOPSMITH** as a Vertical Drill Press. Drills to center of 15-inch circle. 27-inch maximum distance from table to chuck, $4\frac{1}{4}$ -inch feed



3 **SHOPSMITH** as a 12" Disc Sander. Adjustable mitre gauge. 14 $\frac{1}{2}$ " x 17" table tilts to 45 degrees. Discs can be removed and replaced in seconds



4 **SHOPSMITH** as a Horizontal Drill Press. Brand-new in the power tool field! Provides accurate drilling for doweling. No limit on length of work



5 **SHOPSMITH** as a 34" Wood Lathe. (34" between centers) with a 15-inch swing. Quill feed $4\frac{1}{4}$ inches. Tool rest always slides parallel to ways

BIG-CAPACITY TOOLS IN ONE

and a caretaker-trapper often receives several thousand dollars as his share.

Each trapper captures and turns over to the state a number of beavers amounting to 10 percent of the number he is permitted to trap for the market. These animals are then transplanted to unpopulated mountain streams in Idaho's primitive areas.

In past years the state commission used trucks and pack animals for transplanting the beavers but on long trips the animals often perished because they were kept away from water for too long. Now, a journey of any distance is performed by airplane. It's cheaper and more reliable.

Dropping the beavers by parachute is a new experiment and more than 35 of the animals have been dropped successfully to date. It's a tricky operation and it takes a skilled mountain pilot to pick out the stream that has been selected for the drop and to get down to within a couple hundred feet of the ground, the altitude at which the drops are made. The wind must be gauged just right so that the parachute and its burden won't drift into trees. Usually, the chute lands within a hundred feet or so of the stream. A male and female are planted close together on the same stream so that a new colony may be started.

The drop box is hinged at the bottom like a clamshell and is tied with a piece of

weak string. Two lengths of inner-tube rubber are stretched across the bottom and are secured to the sides, tending to make the box break its string and fly open. This can't happen as long as the parachute supports its weight but once the box touches the ground its sides open up and the beaver walks out, heading instinctively for the nearest water.

No one except caretaker-trappers may take beaver in Idaho. Other states have tried open seasons but usually trappers and hunters have depleted the population almost to zero in a single season. Stringent controls have had to be reapplied.

California has been trying a controlled open season in which trappers who have obtained permits are allowed to take pelts in special control areas that contain an oversupply of animals. Once California had so many beavers that fur brigades from the Hudson's Bay Company traveled south to capture them; now the state's population is not more than several thousand.

Each state is doing all that it can to restore the animals to numbers that will permit the taking of some fur and that at the same time will make beavers an important factor in erosion control. Once threatened with extinction, the valuable animals are regaining their original place in the wildlife population.

"You're Sure to Have MORE FUN with a Coleman Along" — Says Andy Devine

"I like plenty of good food wherever I go, and I get it quick with my Coleman Folding Camp Stove without any waiting, fuss, muss or bother. I just set it up and start cooking, and in no time I have the kind of food that satisfies a big outdoor appetite."



Folding CAMP STOVE

Lights instantly. Cooks like a city gas range. Makes and burns its own gas from gasoline. Folds up, carries like a suitcase. Ask your dealer for a demonstration.

Prices as low as \$9.95 in U.S.A.



Andy Devine can currently be seen in the Republic Picture, "The Last Bandit."



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Floodlight LANTERN

Adds more hours of fun to each day. Floodlights 100-ft. area. Storm-proof. Safe. Durable. Prices as low as \$9.95 in U.S.A. Ask your dealer for demonstration.



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The bit brace
preferred
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When a hand tool becomes so well known that craftsmen call it by number, you can be sure it's a tool of unusual quality. That's why expert carpenters and cabinet-makers everywhere are welcoming the return of the No. 32 Millers Falls bit brace.

Yes, No. 32 is back again — with its fine construction, highly polished buffed nickel finish, tropical hardwood sweep handle and head. No. 32 is the country's standard 10-inch quality brace.

Find out what we mean. Ask your hardware dealer to show you the No. 32 bit brace. At the same time see some of the other Millers Falls quality tools. Millers Falls Company, Greenfield, Mass.

**MILLERS FALLS
TOOLS**

SINCE
1868

Chrysler Family Debut

(Continued from page 123)

five body types, the eight-cylinder Saratoga (two body types), New Yorker (four), Town and Country (two), and Crown Imperial (two). New to the line this year is a Royal station wagon which seats nine passengers and has removable intermediate and rear seats.

The wheelbase of the Royal and Windsor series has been increased four inches from 121½ inches to 125½ inches. At the same time the over-all length has been reduced from 208½ inches to 203½ inches. On the Saratoga and New Yorker models the wheelbase has been lengthened from 127½ inches to 131½ inches and the over-all length reduced from 214½ to 210 inches. The Royal and Windsor models are 2½ inches lower, standing at 65¾ inches, and the big eights stand 66 inches high, a reduction of about two inches.

In regard to over-all width, the Royals and Windsors are 4½ inches narrower, being reduced from 77¾ inches to 73½ inches. Despite this, as in the other cars of the company line, the interior is more spacious. On the four-door sedan, the front seat cushion is six inches wider, increasing from 52 to 58 inches, and the rear seat has been widened from 51 to 58 inches. The New Yorker and Saratoga models have been narrowed by 3½ inches and at the same time the front seat is six inches wider and the rear seat seven inches wider.

Windshield area of the new Chryslers has been increased from 687 to 851½ square inches. The rear window also has been enlarged.

Compression ratio has been boosted on both the six and the eight-cylinder engines. On the sixes (Royal and Windsor) the ratio has been increased from 6.7 to 1 to 7 to 1, and on the eights from 6.7 to 1 to 7.25 to 1. Engineers report an accompanying increase in better performance and gasoline economy. The electrical and ignition system has been made more durable and weatherproof as a result of Chrysler's experience in building combat vehicles during the war. All models are equipped with weatherproof spark-plug covers. A new air cleaner and higher-capacity fuel pump are designed for improved engine performance.

The Chrysler instrument panel has been completely restyled and front-seat passengers have plenty of space between them and the right-hand side of the panel. The panel itself is narrower than in the past and concave in shape. Also, the heater installation is under the hood. All of the

(Continued to page 272)

The AMAZING TOOL of 1000 USES

NEW HOME-UTILITY 5" SANDER-POLISHER

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5" Electric Sander-Polisher
5" Molded Rubber Pad
3 "Open Grain" Sanding Discs
(coarse, medium, fine)
Lambwool Polishing Bonnet
7 oz. can of Home-Utility Electric Wax

This great new Home-Utility 5" Sander-Polisher is the most versatile workshop tool you've ever seen! It drives a whole raft of attachments. You'll figure out new uses every time you work with it. And it's quality-built by BLACK & DECKER, famous maker of outstanding electric tools for over 38 years!

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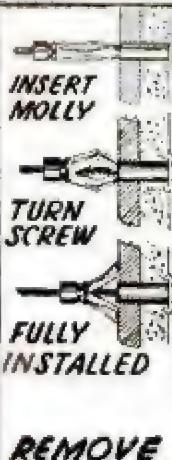
Products of BLACK & DECKER Mfg. Co.
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Most revolutionary attachment ever offered for small portable electric tools. Sands difficult bevels, ends of wood, plastics, etc. With mitre gage, material can be sanded to any angle. Sharpens edged tools, chisels, etc.

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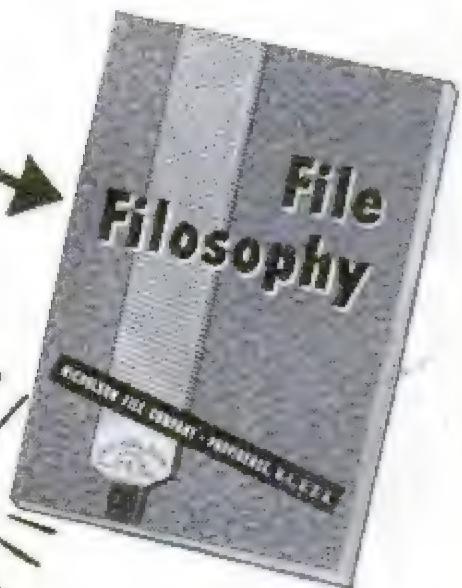
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instruments are grouped in a semicircular "safety eye" housing directly over the steering column and to the right a leather-covered safety cushion of sponge rubber extends to the door. This affords protection to front-seat passengers, particularly children, in case of a sudden stop.

The Chrysler's Prestomatic Fluid-Drive transmission has been simplified as to the hydraulic and electrical parts in an effort to minimize mechanical and control difficulties. New gearshift-control-lever lengths and more rigid connecting links make the shifting easier and quieter.

All the innovations of the Plymouth and Dodge cars, such as the new ignition switch, diagonally mounted shock absorbers and coated cylinder walls are found in the Chryslers. All Chryslers are now given an application of undercoating at the factory.

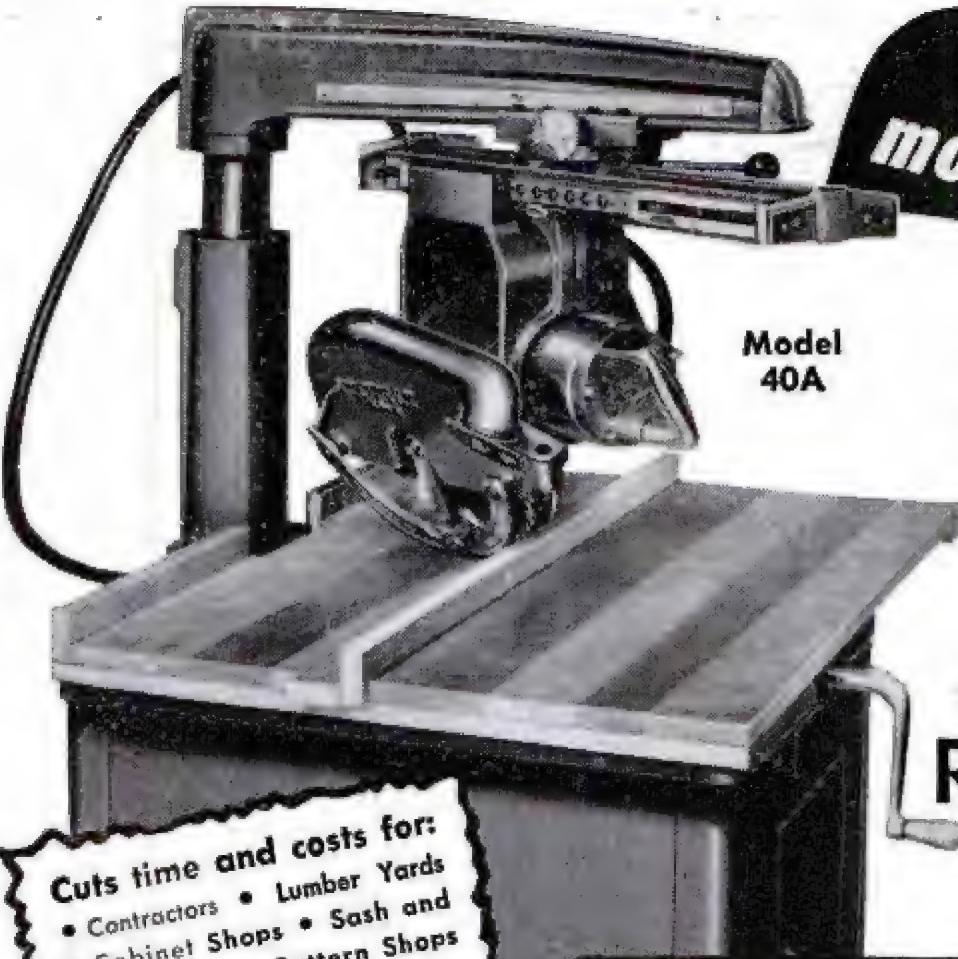
The 1949 DeSoto conforms with the other products of the company line in conservative beauty, excellent visibility, increased wheelbase (from 121½ to 125½ inches), reduced over-all length, much wider seats and slightly narrower exterior width, detachable fenders, wrap-around bumpers and lower silhouette. The engine has an increased compression ratio and slightly boosted horsepower.

The new DeSoto is a comfortable car with "chair high" seats to let the driver and passengers take advantage of the better visibility. The steering wheel has been placed so that shorter drivers may see over it easily and long-legged drivers will not bump their knees into it. Tip-Toe hydraulic shift and Fluid Drive are retained in the '49 DeSoto. All of the mechanical improvements on the other Chrysler Corporation cars, from new ignition system to nonsway shock absorbers, are incorporated in the new DeSoto.

The Custom line includes a four-door sedan, club coupe, convertible, Suburban and eight-passenger sedan. The Deluxe line has a four-door sedan, club coupe, station wagon and a Carry-All sedan. The latter has a rear seat that can be quickly folded flush with the floor to provide extra luggage space.

Light "Watchman"

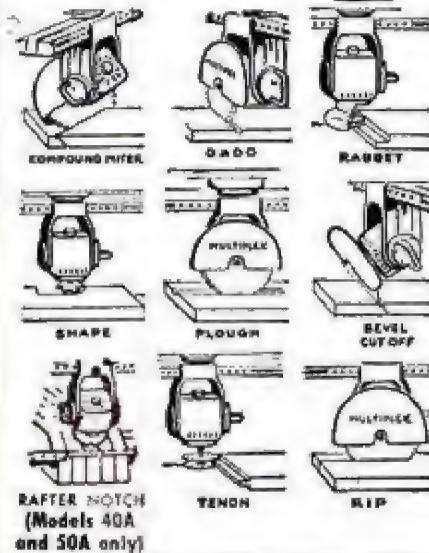
For persons who want their homes lighted evenings when they are out, there is a new miniature electronic control that switches lights on and off at preset times. It can be plugged into any electrical outlet. The device can also be used to control lighting in stores, dark hallways, garages and poultry sheds.



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Model 20A—Bench model. An exceptionally low-cost portable machine. Can be carried easily in the back of your car. Has a rip capacity up to 2". A favorite of builders, for cutting interior trim. With $\frac{1}{2}$ H.P. Single Phase 110 Volt \$1950*

F.O.B. Norwalk, Ohio

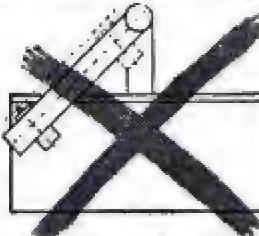
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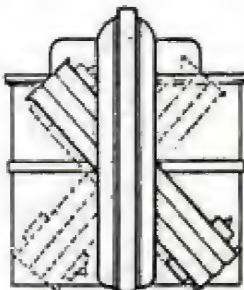
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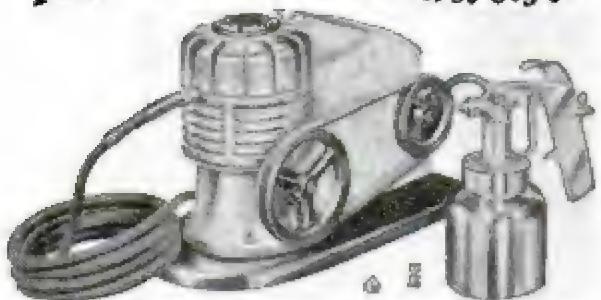
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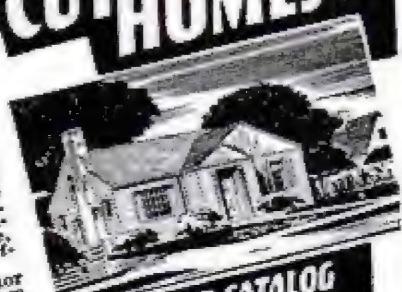
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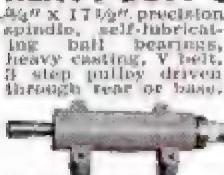
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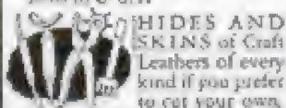
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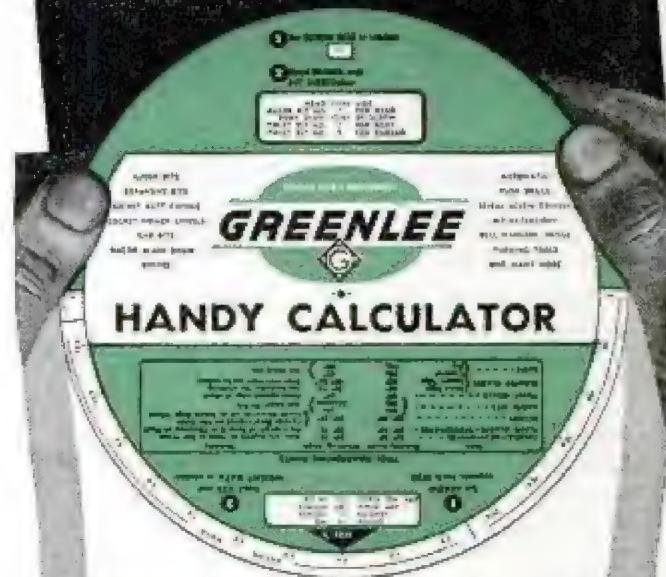
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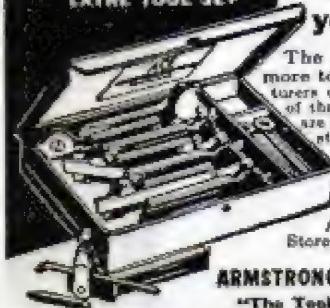
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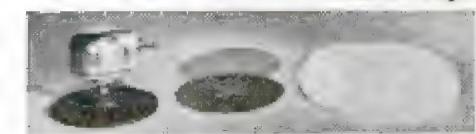
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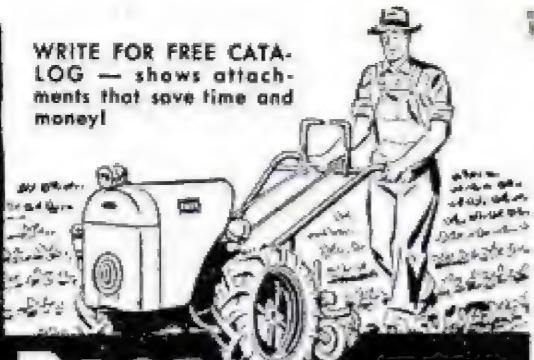
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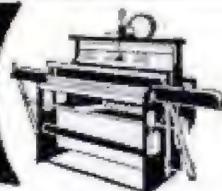
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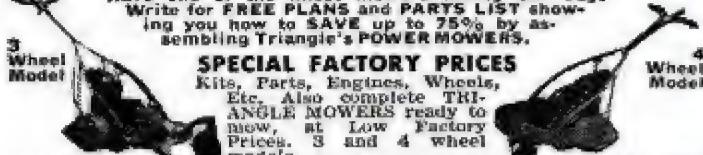


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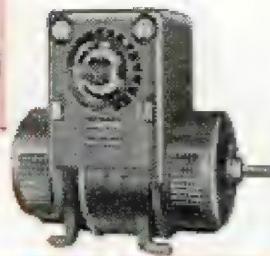
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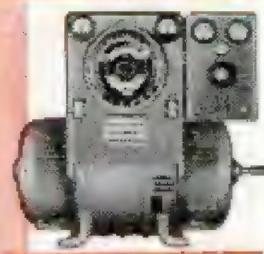
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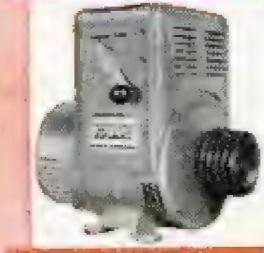
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Send me without obligation a sample of Leather-New coated material so I can inspect it.

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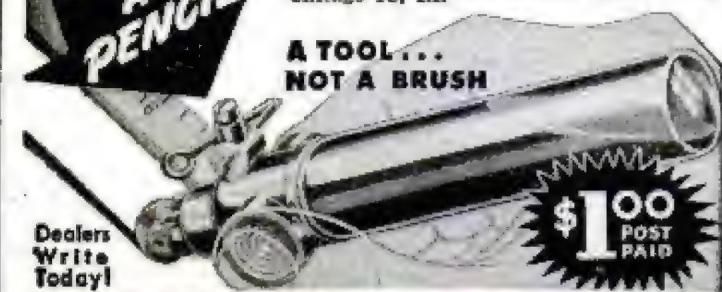
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Pocket-Size ELECTRIC WATER HEATER
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Place heater in water, plug in electric socket. Boiling water in a "jiffy". Order now! Pay postman or send \$1.95 to Starr Mfg. 3521 Wesleyan Drive, Toledo, Ohio.



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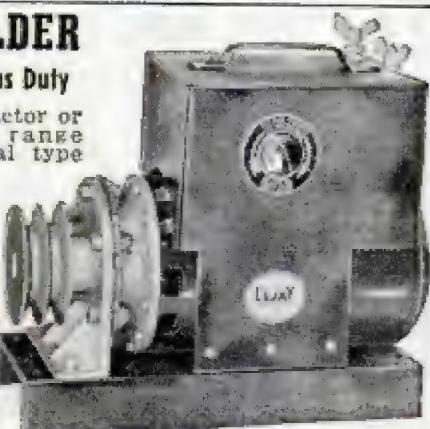
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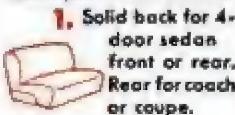
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KEEPS YOUR WORK WELL IN VIEW

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 (Money back either way if not delighted)

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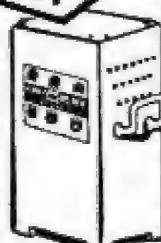
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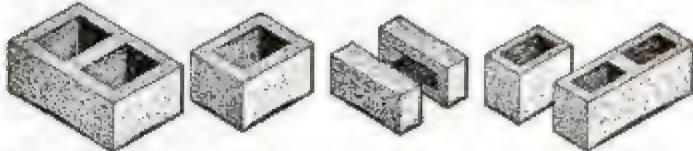
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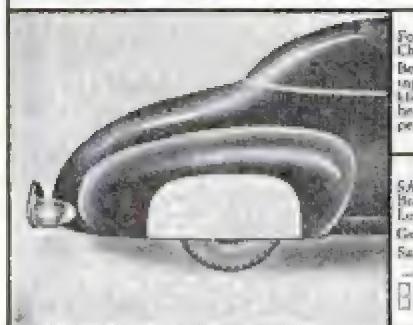
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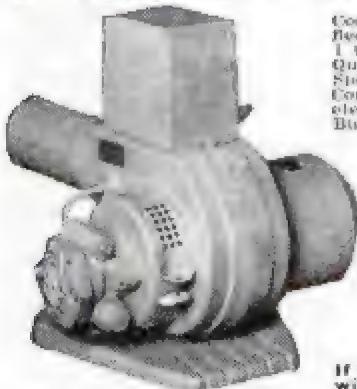


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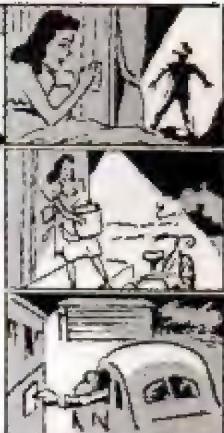
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Modern design, momentary contact 24 volt switch.

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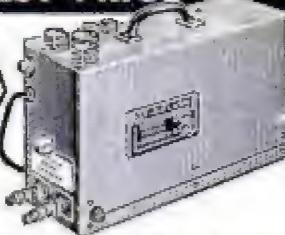
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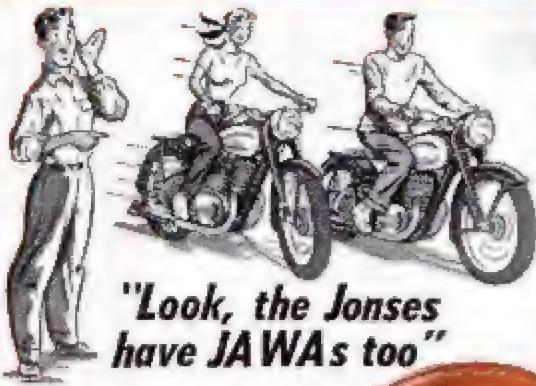
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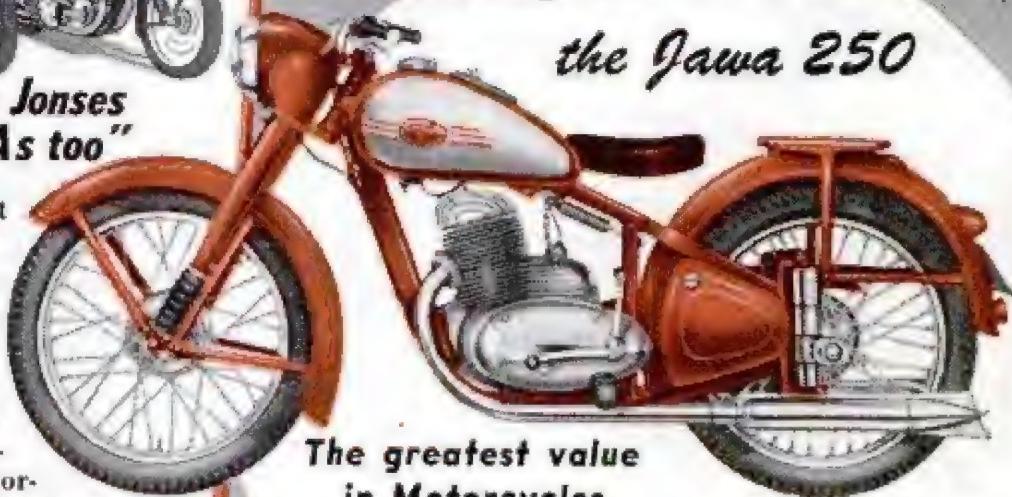
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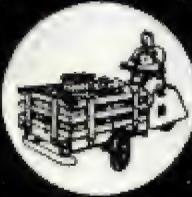
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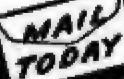
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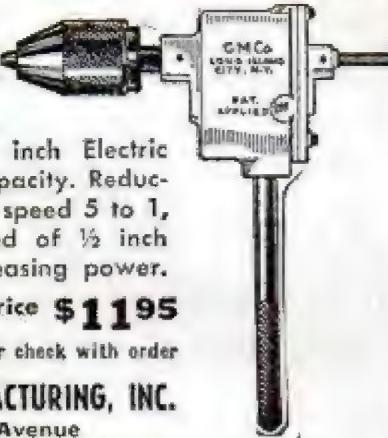
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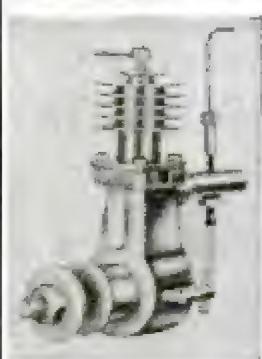
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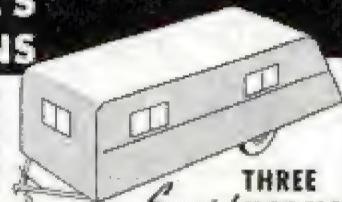
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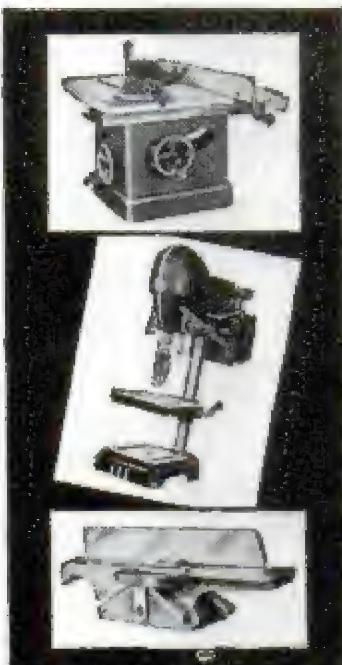
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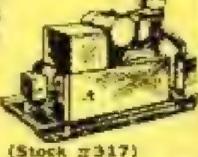
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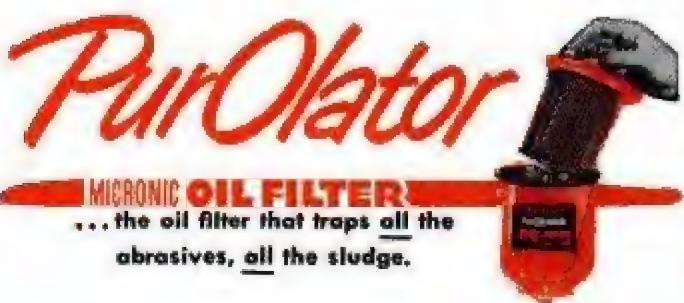


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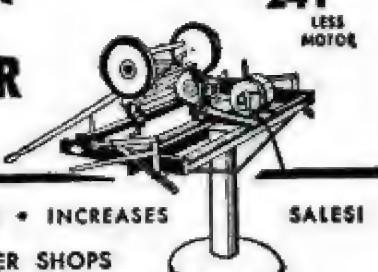


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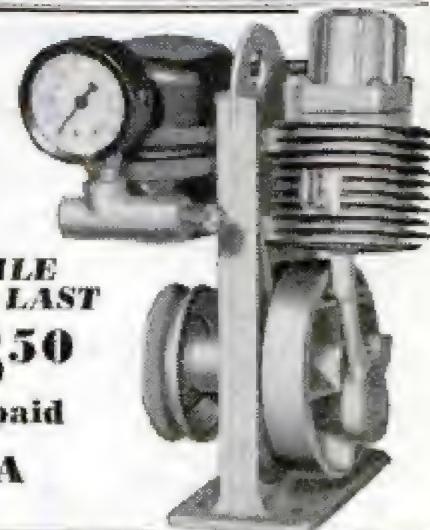
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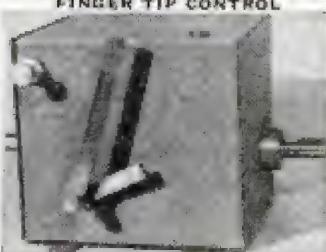
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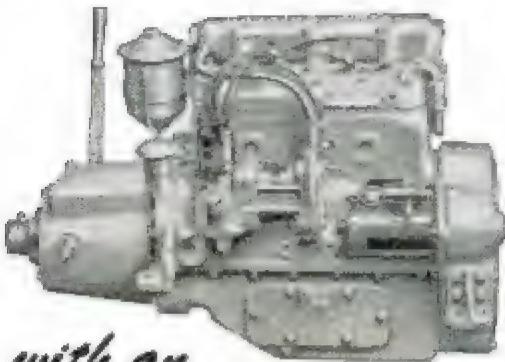
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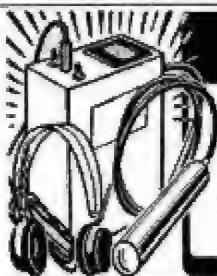
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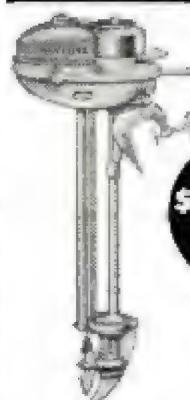


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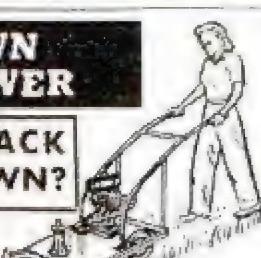
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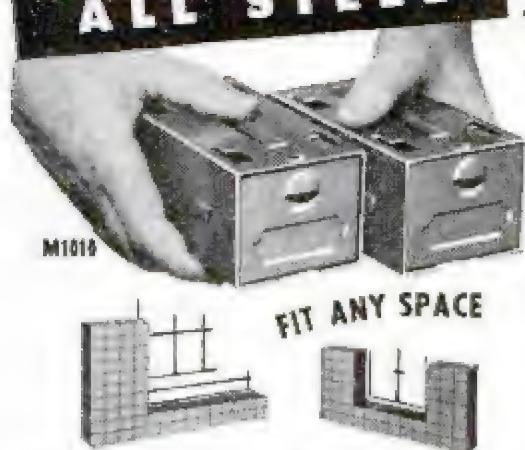
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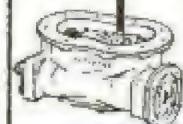
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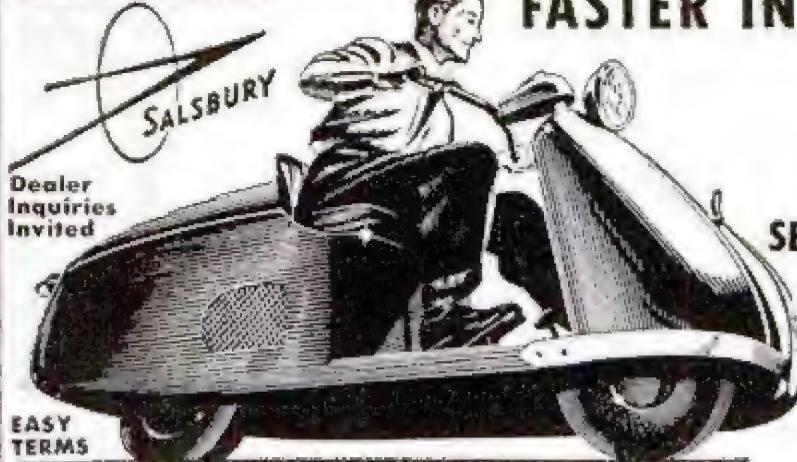
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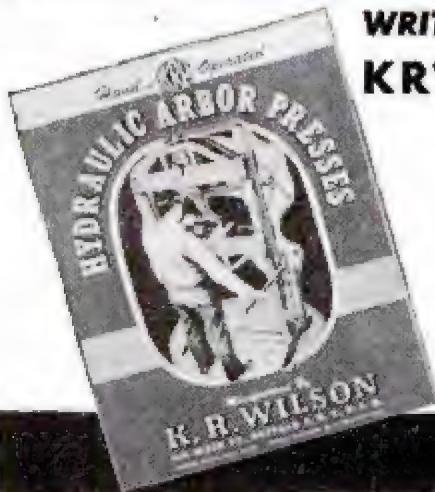
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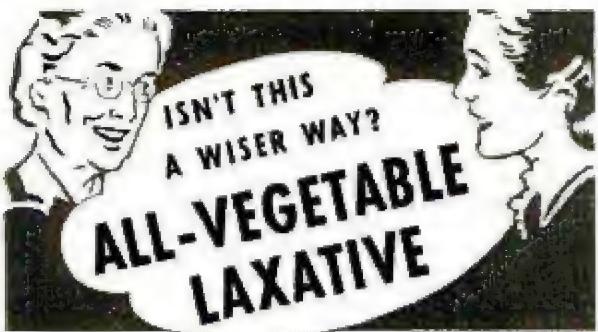
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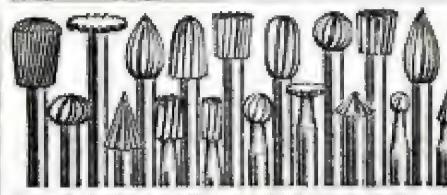


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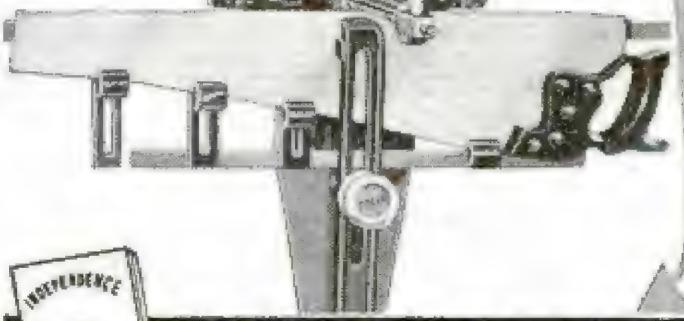
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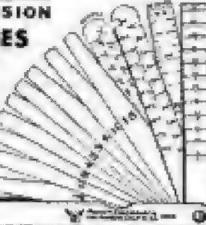
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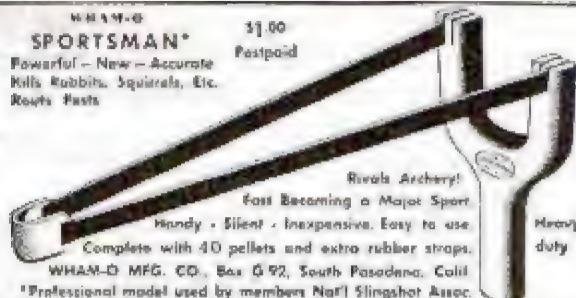
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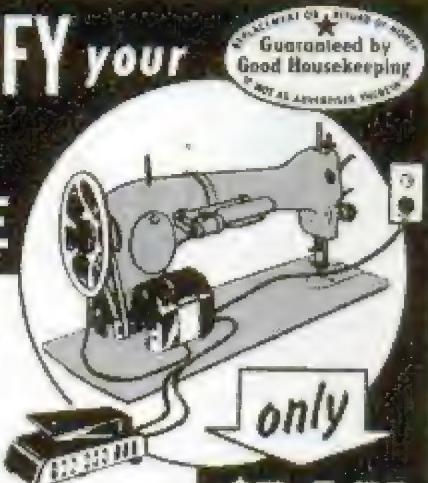
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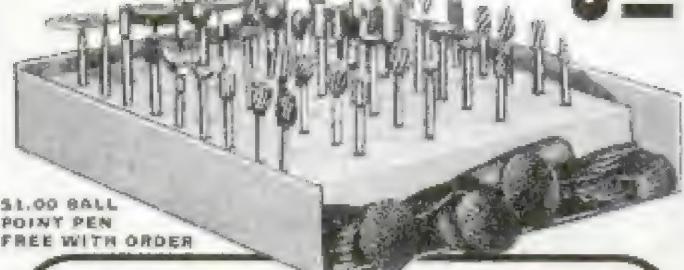
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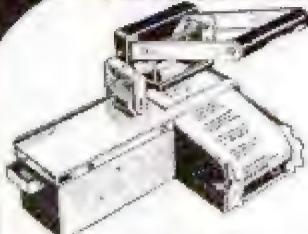
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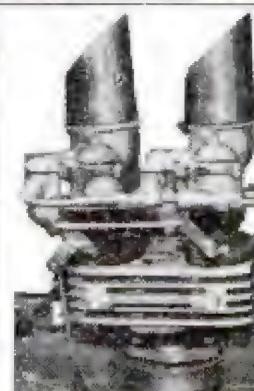
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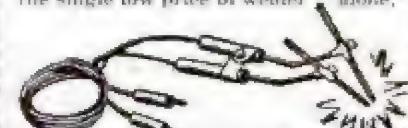
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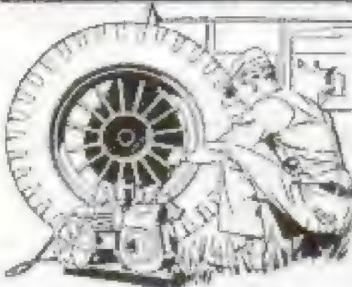
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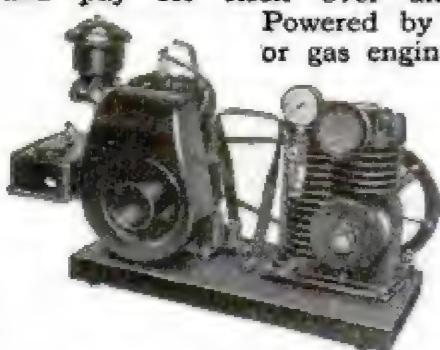
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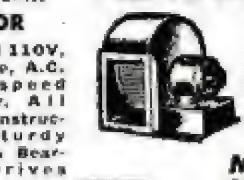
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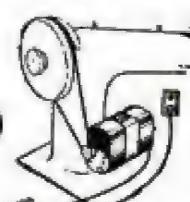
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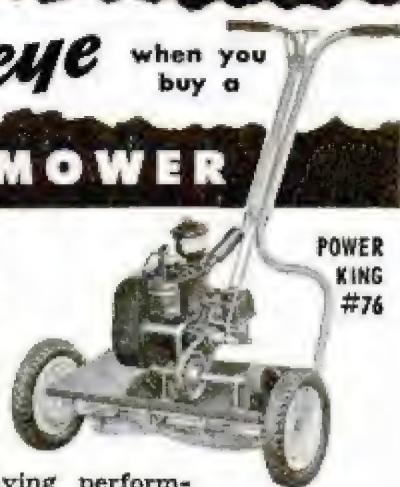
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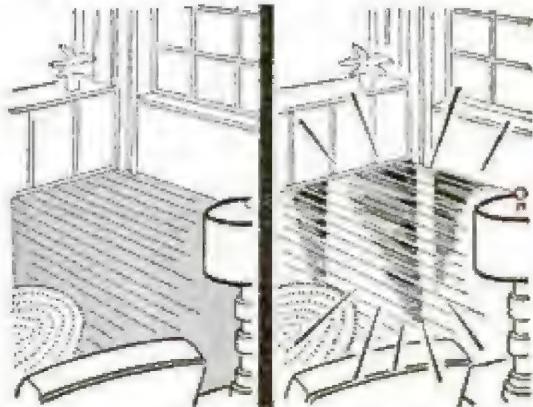
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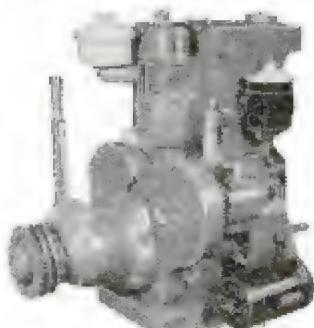


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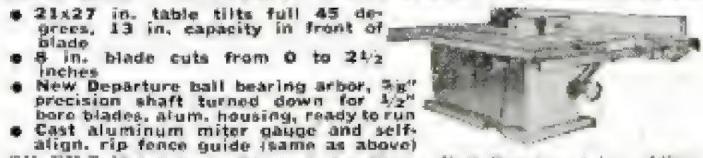
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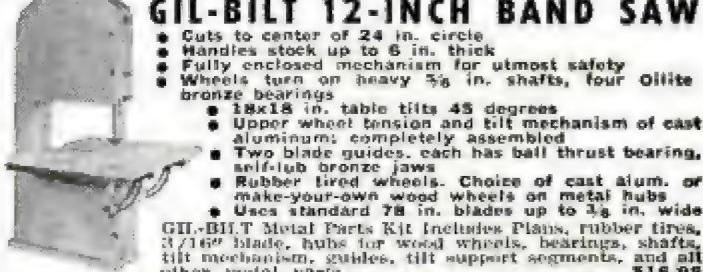
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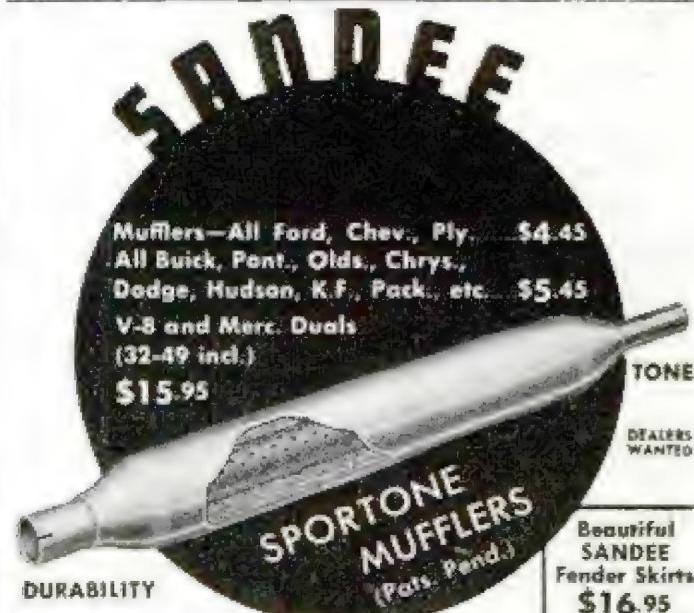
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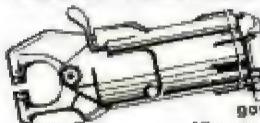
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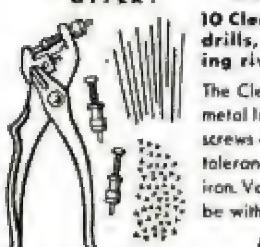
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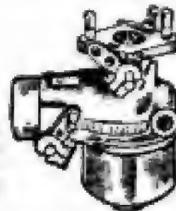


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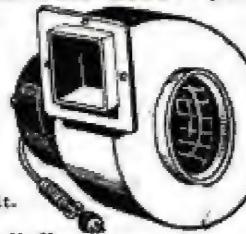
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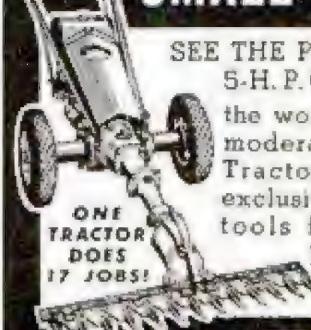
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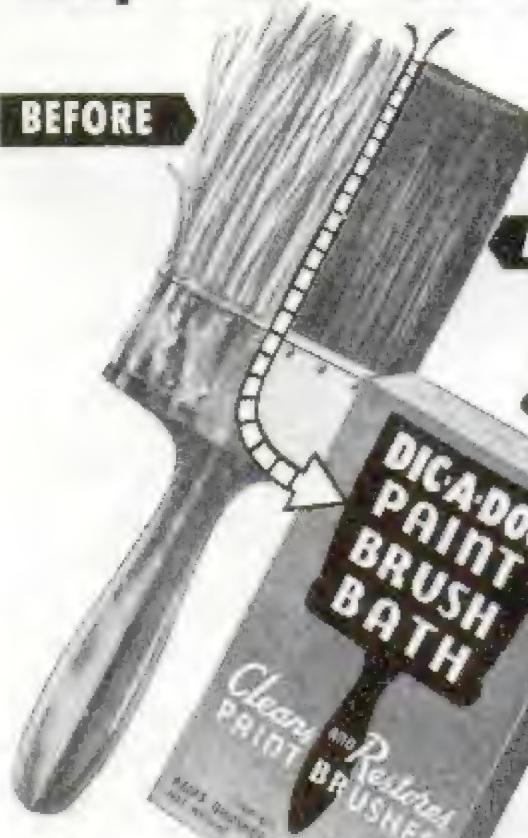
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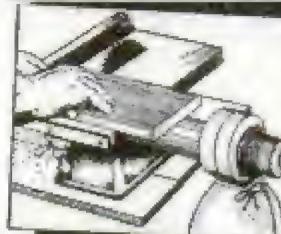
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plus pressure tank, pop valve, gauge for tank, air regulator & gauge, filter, 20 ft. air hose, check valve & air chuck

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Wherever compressed air is needed

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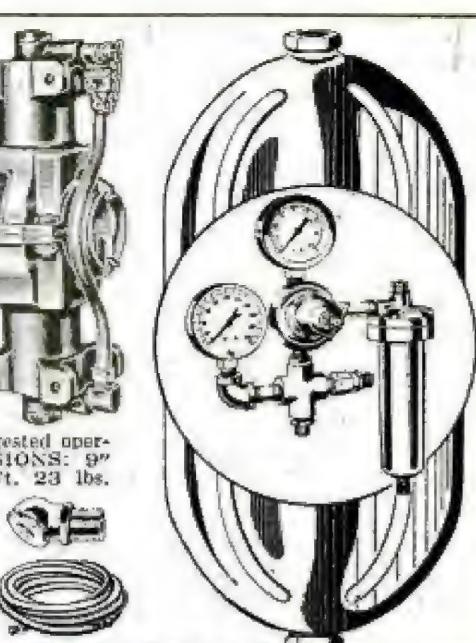
Equipment Less Compressor \$19.50

THE COMPRESSOR

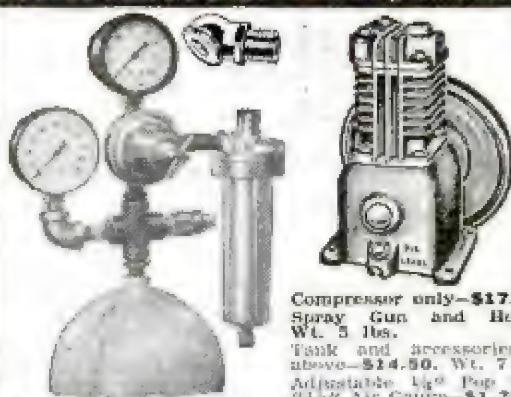
Piston Type, 2-cylinder, 2 inch bore, 1 1/2" Stroke Ball Bearing, AUTOMATIC CLUTCH, OIL FREE AIR, 3.27 c.f.m. at 600 R.P.M. 6.54 at 1200. Suggested operating pressure 75 P.S.I. DIMENSIONS: 9" wide, 11 1/8" high, 6 1/8" deep. Wt. 23 lbs.

AIR TANK

Stainless steel, size 12" x 24" with 2 quarter inch openings. Suitable for 150 lb. pressure. Equipped with gauge to show tank pressure, air regulator & gauge to regulate pressure, safety valve, oil and water trap.



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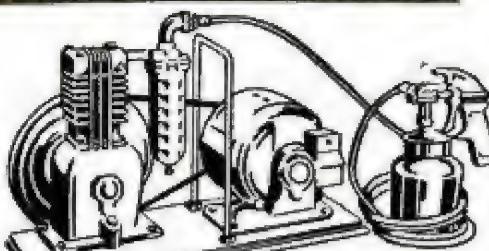
Compressor only—\$17.95
Spray Gun and Hose—\$10.45—
Wt. 5 lbs.
Tank and accessories as shown
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equipped Portable Spray
Painting outfit for use where

average viscosity paints, enamels, lacquers, var-

nishes, etc. Piston type, single cylinder air compres-

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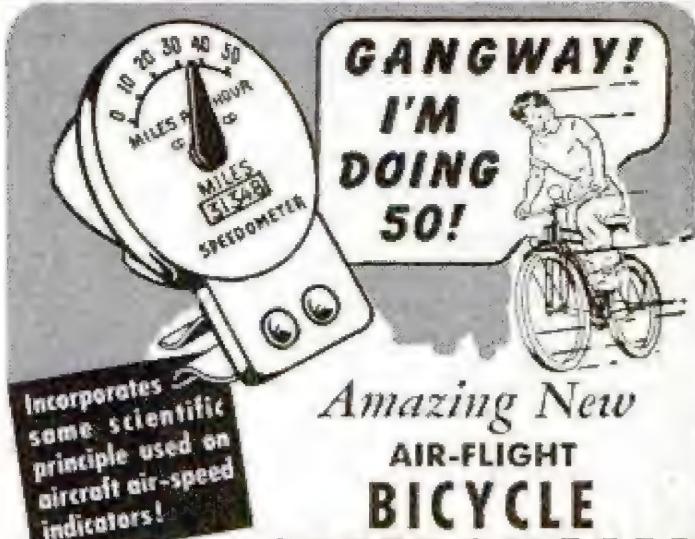
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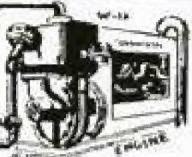
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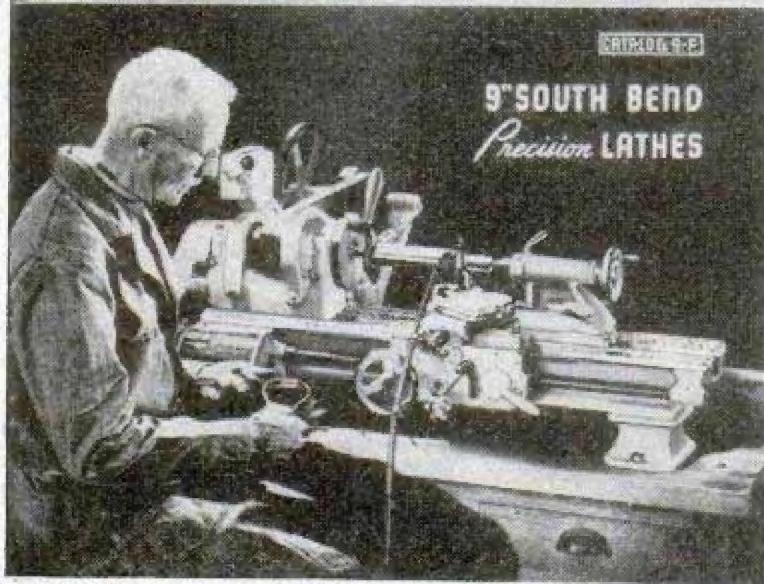
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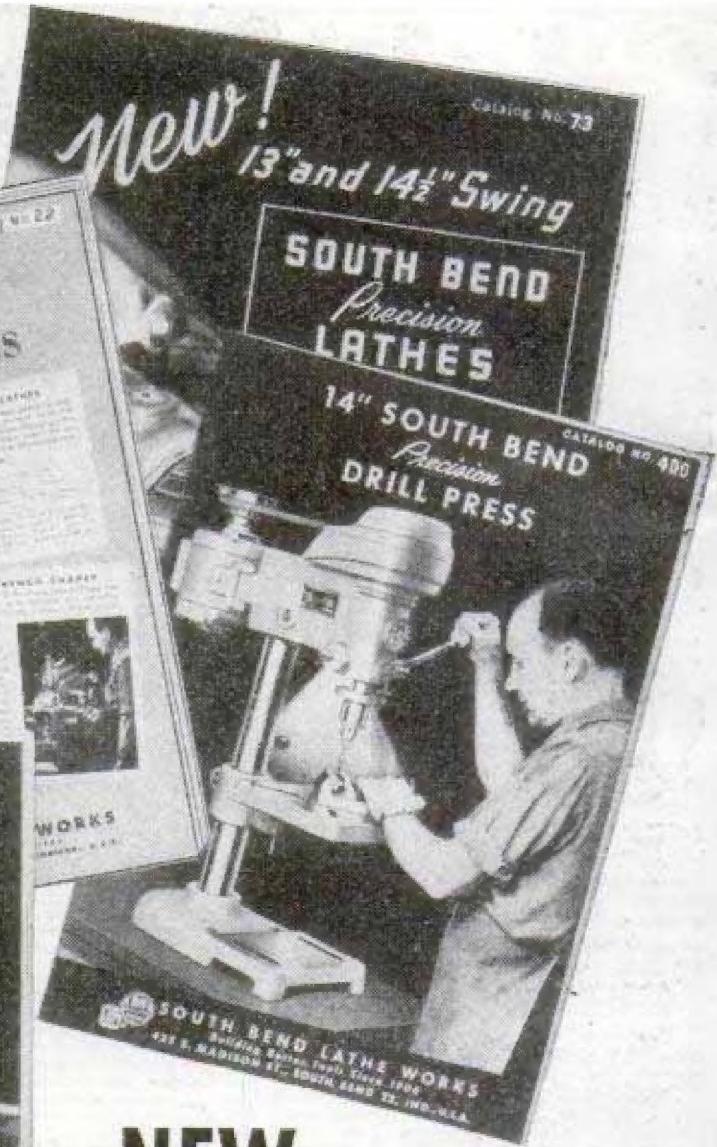
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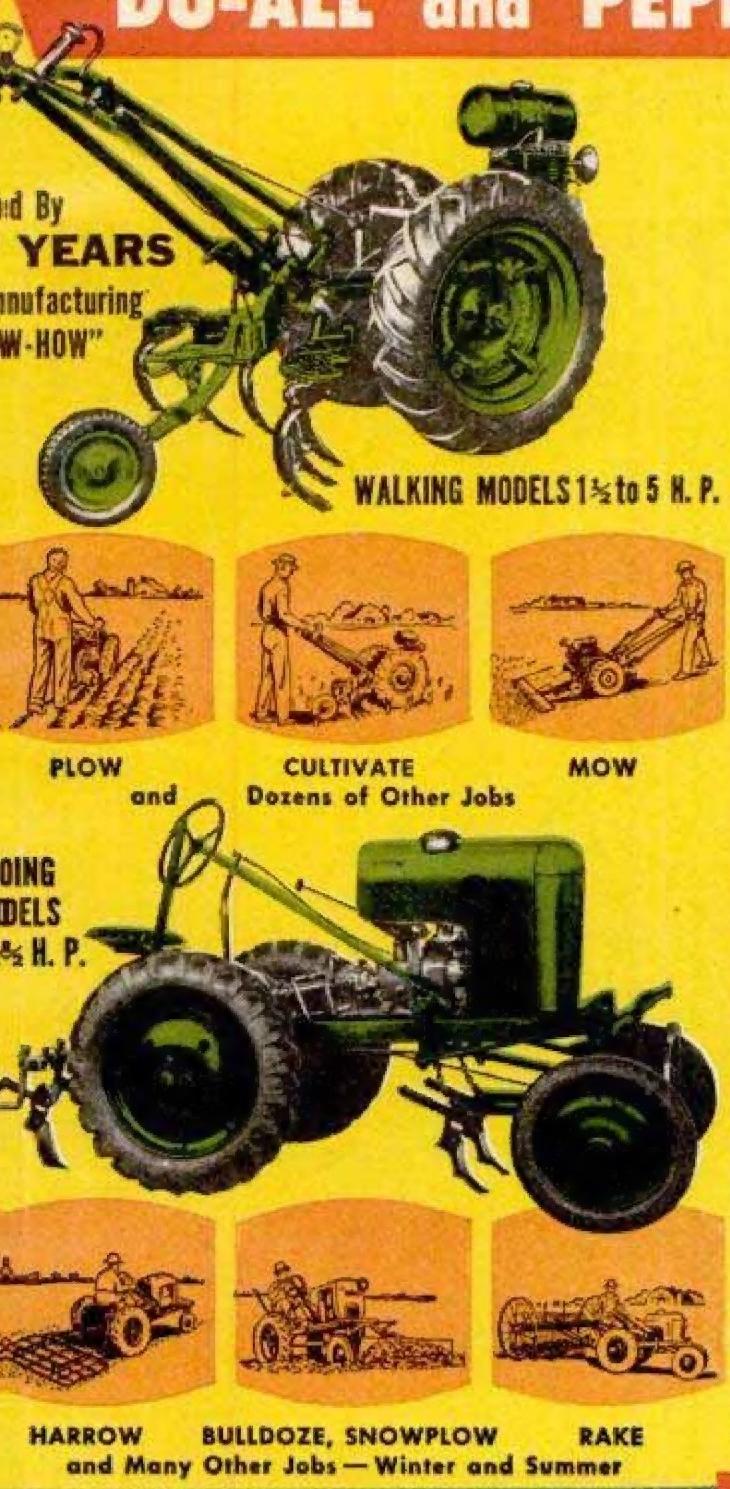
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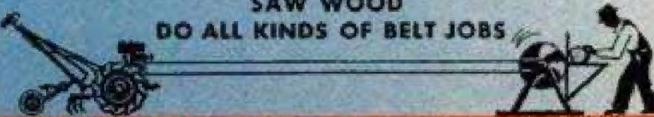
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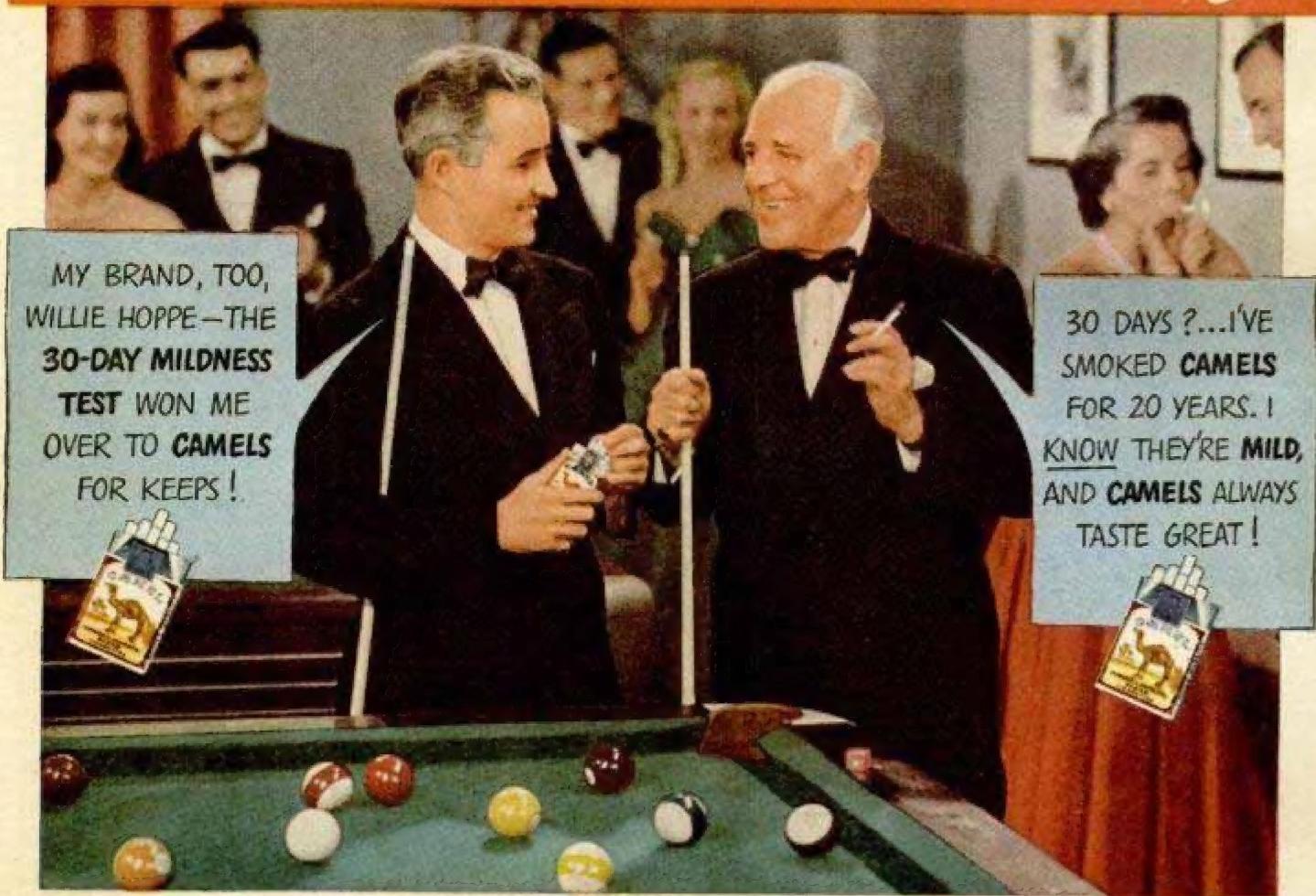


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